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ABSTRACT

This task-based curriculum guide is intended to help secondary teachers provide relevant training for an entry-level job as an electrician. Introductory materials include background information on trade and industrial education and program goals and safety information. Descriptions follow of the construction trades program, vocational cooperative education, work experience/unpaid work experience, work experience and career exploration programs, and vocational work study. This job information is then provided: job titles and a task inventory for electricity (construction trades). Tasks are grouped under these nine duties: computing service loads; installing service entrance; installing switch boxes and outlet boxes; roughing in feeders, branch circuit cables, and circuits; trimming out electrical devices and appliances; installing lighting fixture; installing electrical environmental control components; maintaining existing wiring; and using employability skills. Duty tabs comprise the largest portion of the curriculum guide. Each task in the listing is presented in a one-page format that provides this information: duty, task, achievement indicators, criteria, tools and equipment, and resources. Other components of the curriculum guide include a student achievement record, a class achievement record, and a glossary of vocational terms. (YLB)

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MICHIGAN TRADE & INDUSTRIAL EDUCATION
CURRICULUM GUIDE

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INTRODUCTION

The Michigan Department of Education, Vocational-Technical Education Service, has adopted descriptions and codes for vocational-technical education programs found in the document entitled, "A Classification of Instructional Programs" (C.I.P.) National Center for Educational Statistics, February, 1981. This new coding system is required of all states in reporting data on all programs receiving funds under P.L. 94-482, the Vocational Education Amendments of 1976.

The current United States Office of Education (U.S.O.E.) coding system was discontinued at the conclusion of the 1981-82 school year. The 1982-83 school year is a transition year from the U.S.O.E. code system to the new C.I.P. Code system.

This Michigan Trade and Industrial Education Curriculum Guide uses the new C.I.P. program description code(s) and lists the entry level job titles associated with the occupational program area by the Dictionary of Occupational Titles (Fourth Edition, 1977), D.O.T. Code, and the Michigan Occupational Information System, (M.O.I.S.), Numerical Index code. NOTE: This information is located under Job Information with program description(s).

PROGRAM DEFINITIONS/GOALS

Vocational Education

The term "vocational education" means organized educational programs which are directly related to the preparation for paid or unpaid employment or for additional preparation for a career requiring other than a baccalaureate or advanced degree.[1]

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[1] The Education Amendments of 1976, Section 195(1), Public Law 94-482.

Goals of Vocational-Technical Education

(1) To provide persons with differing sex, age, racial/ethnic backgrounds, social-economic status, academic disadvantage, economic disadvantage, limited English speaking ability, physical and mental capabilities, and geographical location access to vocational-technical education training or retraining.

(2) To coordinate pre-vocational exploration, career guidance, and placement programs so that each student may make informed and realistic occupational choices and have access to quality placement programs.

(3) To provide all students with learning experiences which are realistic and sufficient in light of their occupational objective.

(4) To insure that all vocational-technical programs will be planned, monitored, and evaluated in light of actual or anticipated employment opportunities and the demand by students for programs related to their abilities and occupational objectives.

Trade and Industrial Education

A vocational education curriculum that includes programs for manufacturing, construction, mechanical service, public service, health service, technical, and fisheries occupations, that prepares a person for entry level employment, upgrading or retraining in a semiskilled or skilled trade, semiprofessional or technical occupation, not generally classified as Agriculture, Distributive, Business or Office, in the Health profession, or Consumer/Home Economics in nature.

NOTE: The occupational clusters found within the scope of trade and industrial education include skilled or semiskilled trade, craft, or occupations which directly relate to the designing, producing, processing, assembling, maintaining, servicing, or repairing of any manufactured product.

TRADE AND INDUSTRIAL EDUCATION STUDENT ORGANIZATION

VICA

The Vocational Industrial Clubs of America (VICA) is the national organization serving trade, industrial, technical, and health occupations students in the United States. VICA incorporates leadership, citizenship, and character development programs and activities into the skill training offered in America's schools and taught by men and women who have worked in the occupational areas in which they now instruct their students.

VICA emphasizes respect for the dignity of work, high standards in trade ethics, workmanship, scholarship, and safety. VICA promotes understanding of the free enterprise system and encourages development of patriotism through the practice of democracy within the club.

Competitive activities in the trade skills as well as areas such as public speaking, job interview, parliamentary procedure and safety are vital aspects of VICA's program.

TRADE AND INDUSTRIAL EDUCATION CURRICULUM GUIDE

This Michigan Trade and Industrial Education Curriculum Guide is the result of a project funded by the Michigan State Board of Education and the Michigan Department of Education, Vocational-Technical Education Service. The project is located at Michigan State University in the College of Agriculture and Natural Resources' Education Institute (ANREI) and is known as the Curriculum Resource Team.

The project is directed by Dr. Chris M. Olson and Ms. Carol E. Culpepper, Faculty Specialist, Curriculum Resource Team Coordinators. They were responsible for developing the curriculum format and working with a task force leader and committee of individuals from business, industry, and education to ensure the quality of the curriculum. The development of this curriculum was monitored by Melvin France, Secondary Trade and Industrial Education Supervisor.

The names of the occupational task force leader(s) committee members, secretaries, and other support staff are acknowledged after this Introduction.

The occupational program area(s) selected for curriculum development are based on a Vocational-Technical Education Service prioritized program ranking based on employment demand, State average percent of placement, reimbursed enrollments, the number of programs, and entry level wages within the State of Michigan.

This curriculum guide was developed from the results of a statewide survey and job analysis of incumbent workers in the related occupational areas.

The curriculum guide is representative of the occupational job duty categories which list major activities and tasks performed on an entry level job. The curriculum guide contains a resource list and criteria statements which indicate the minimum standards of performance accepted as evidence of competence in completion of the task by business and industry. This is a task-based curriculum guide which helps a teacher develop a classroom management system where students learn by doing. It is based on task analysis and reflects the skills, knowledge, and attitudes that employers expect incumbent workers to possess.

The curriculum is linked to the labor market, helps the instructor open communication channels with business and industry, and manage classroom instruction where students learn "Need-to-Know" instead of "Nice-to-Know" facts.

This curriculum is adaptable for special needs/handicapped students, helps to validate the program, prepares students for entry level jobs and helps students to make career choices related to job placement.

It is the intent by all those involved in the development of this curriculum guide that it be used to provide relevant training or retraining for employment in the world of work.

The secondary occupational programs/courses in Michigan should meet the following minimum standards to assure soundness and quality of instruction:

(1) The program of instruction must be based on a consideration of the skills and knowledge required in the occupation for which the

instruction is being provided, and includes a planned logical sequence for those essentials of education or experience deemed necessary for the individual to meet an occupational objective.

(2) The program of instruction must be developed and conducted in consultation with a Local Advisory Council/Committee which has an appropriate representation of both sexes and an appropriate representation of racial and ethnic minorities found in the program area, school, and community origin. The local advisory council will advise on current job needs, relevance of programs, and courses in meeting current job needs and consult with the local educational agency in developing program application.

(3) The program of instruction will include the most up-to-date curriculum based on the competencies required in the occupation or occupational field in which the individual is being prepared, upgraded, or updated.

(4) The program of instruction will be sufficiently extensive in duration and intensive within a schedule unit of time to enable the student to develop the necessary knowledge, attitudes, and skills necessary for employment in the occupation or occupational field.

(5) The program of instruction will combine and coordinate related instruction with field, shop, laboratory, cooperative work, or other occupational experience which is appropriate to the vocational objective of the student, is of sufficient duration to develop competencies necessary for employment in the occupation or occupational field, and supervised, directed, or coordinated by a person qualified under the State Plan.

Facilities, equipment, and instructional materials:

(1) Classrooms, libraries, shops, laboratories, and other facilities, including instructional equipment, supplies, teaching aids, and other materials will be adequate in supply and quality to meet the standands approved by the State Board so that such facilities are adequate to enable those who are to be trained to meet the occupational objective for which the education is intended.

(2) If the State Board or local educational agency cannot provide adequate facilities and materials, and such are available in a business or industrial establishment, funds may be used to reimburse the local public educational agency for training programs conducted in private industry when it complies with the training standards and regulations established by the State Board. Such instruction shall be under the supervision and administration of a local public educational agency.

ACKNOWLEDGEMENT

The Michigan Trade and Industrial Curriculum Guide(s) were developed through a series of workshops held throughout the State and at Michigan State University during the 1982-83 school year.

Appreciation is given to all who have contributed their thoughts, time and energy to this curriculum project.

The Michigan Department of Education, Vocational-Technical Education Service, is indebted to the following individuals who were instrumental in the completion of this project and the development of the materials:

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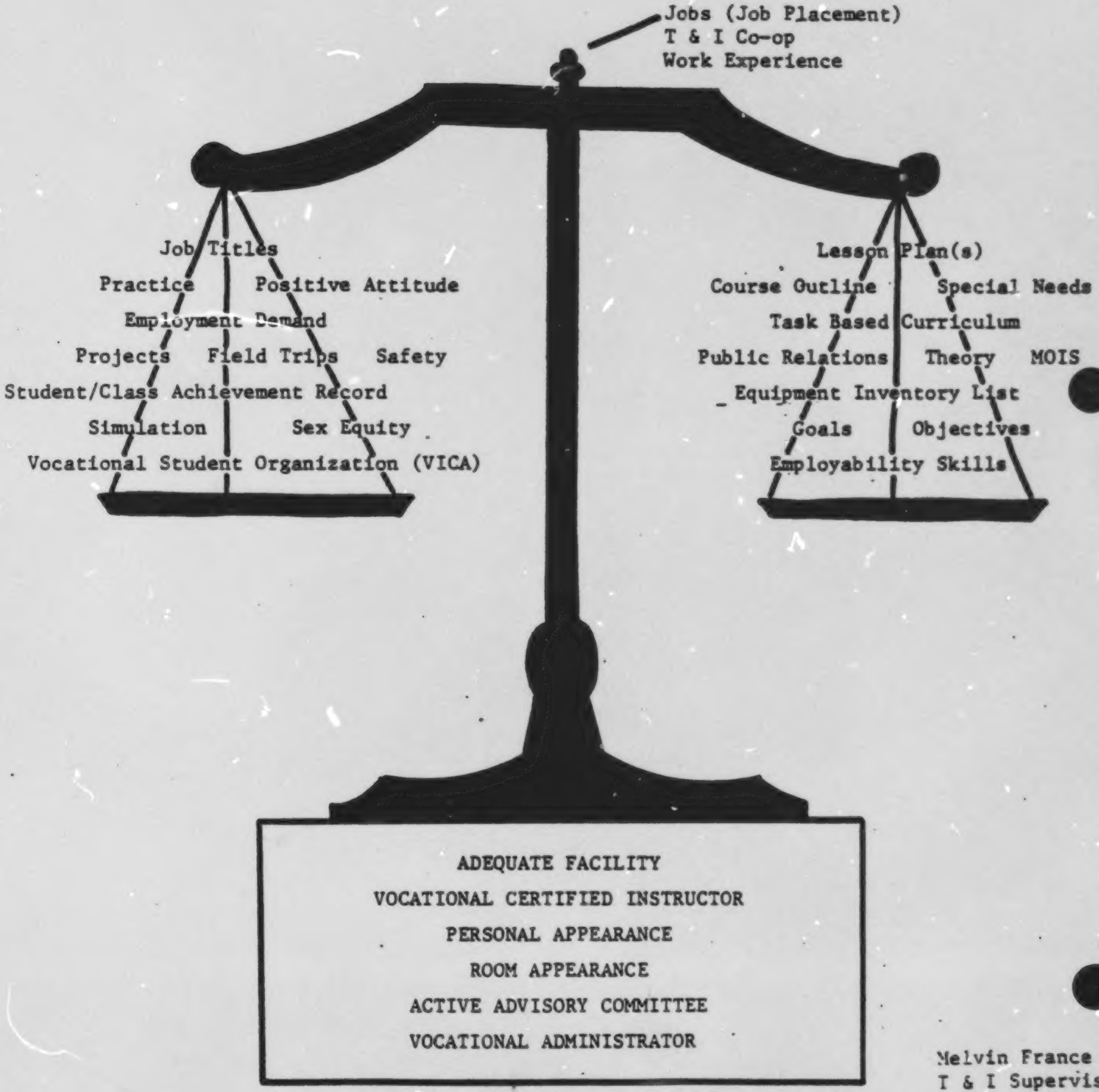
MICHIGAN TRADE AND INDUSTRIAL EDUCATION

IS YOURS A BALANCED PROGRAM?



Jobs (Job Placement)
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Simulation
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Goals
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Employability Skills

ADEQUATE FACILITY
VOCATIONAL CERTIFIED INSTRUCTOR
PERSONAL APPEARANCE
ROOM APPEARANCE
ACTIVE ADVISORY COMMITTEE
VOCATIONAL ADMINISTRATOR

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T & I Supervisor
Secondary Unit

DEPARTMENT OF EDUCATION

STATE BOARD OF EDUCATION

EYE PROTECTIVE DEVICES

Filed with Secretary of State,

These rules take effect 15 days after filing with the Secretary of State

(By authority conferred on the state board of education by section 585a of Act No. 269 of the Public Acts of 1955, as added, being section 340.585a of the Compiled Laws of 1948.)

R 340.1301. Definitions.

Rule 1. As used in these rules:

(a) "Caustic" or "acid" means a material, exclusive of hot water or steam, capable of destroying, eroding or burning of flesh by chemical action.

(b) "Explosive material" means a substance capable of a large-scale, rapid and spectacular expansion which will propel materials in a manner causing injury to the human body.

(c) "Hot liquid" or "solid" means a material having effects that are physically harmful to the eyes.

(d) "Sanitizing" means the disinfecting and cleaning of eye protective devices before use.

(e) "When exposure to eye danger exists" means the exposure when a person is within that distance from sparks, flying particles, rays, molten metal, fumes, glare, glass breakage or chemical splash that such an object or condition could cause damage to his eyes, if he was not using a protective device.

R 340.1302. Educational courses requiring eye protection.

Rule 2. A public educational agency which enrolls students in the following courses when exposure to eye danger exists, shall furnish eye protective devices: vocational or industrial arts shops or laboratories involving the use of or working with hot molten metals, milling, sawing, turning, shaping, grinding, cutting or stamping of any solid materials; heat treatment, tempering or kiln firing of any metal or other materials; gas or electric arc welding; repair or servicing of any vehicles; caustic or explosive materials; or chemical or combined chemical-physical laboratory work involving acid, caustic or explosive chemicals or hot liquids or solids.

R 340.1303. Standards for devices.

Rule 3. (1) An eye protective device shall meet the following standards based upon the operation involved:

(a) Acetylene burning, acetylene cutting, and acetylene welding operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or welding goggles of coverspec type with tinted plate lenses. This protects against the primary hazards of sparks, harmful rays, molten metal and flying particles.

(b) Chemical handling operations - goggles of flexible fitting with hooded ventilation or face shield with plastic or mesh window. This protects against the primary hazards of splash, acid burns and fumes.

(c) Chipping operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or spectacles of metal frame with sideshields or spectacles of plastic frame with sideshields or spectacles of metal-plastic frame with sideshields or chipping goggles of eyecup type with clear safety lenses or chipping goggles of coverspec type with clear safety lenses. This protects against the primary hazard of flying particles.

(d) Electric (arc) welding operations - welding goggles of coverspec type with tinted plate lenses or welding helmets or welding helmet in combination with tinted lens spectacles. This protects against the primary hazards of sparks, intense rays and molten metal.

(e) Furnace operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or welding goggles of coverspec type with tinted plate lenses. This protects against the primary hazards of glare, heat and molten metal.

(f) Light grinding, machining, and spot welding operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or spectacles of metal frame with sideshields or spectacles of plastic frame with sideshields or spectacles of metal-plastic frame with sideshields or face shield with plastic or mesh window. This protects against the primary hazards of flying particles and sparks.

(g) Heavy grinding operations - goggles of flexible fitting with regular ventilation or goggles of cushioned fitting with rigid body or chipping goggles of eyecup type with clear safety lenses or chipping goggles of coverspec type with clear safety lenses or in case of severe exposure add face shield with plastic or mesh window. This protects against the primary hazard of flying particles.

(h) Laboratory operations - goggles of flexible fitting with hooded ventilation or face shield in combination with metal or plastic frame spectacles with sideshields. This protects against the primary hazards of chemical splash and glass breakage.

(i) Molten metal operations - welding goggles of eyecup type with tinted lenses or welding goggles of coverspec type with tinted lenses or face shield in combination with metal or plastic frame spectacles with sideshields and tinted lenses. This protects against the primary hazards of heat, glare, sparks and splash.

(2) The standards described in subrule (1) are taken from the American National Standards Safety Code Z87.1-1968, figure 8, page 28, which is available from the American National Standards Institute, Incorporated, 1430 Broadway, New York, New York 10018, at a cost of $5.00. Applicable excerpts from the American National Standards Safety Code are available at no cost from the Michigan department of education, Lansing, Michigan.

R 340.1304. Sanitization of devices.

Rule 4. An eye protective device shall be sanitized when 2 or more students use the same device, by either:

(a) Washing after each use in warm water and soap or detergent, followed by a rinse in running water.

(b) Placing in a cabinet with ultraviolet light and washing once a week as in subdivision (a).

R 340.1305. Compliance.

Rule 5. (1) A superintendent of a school district shall certify to the intermediate school district superintendent not later than the second week of each school year, on forms prescribed by the Michigan department of education, that eye protective devices meeting the standards of these rules have been obtained. For the school year 1972-73, certification shall be made within 4 weeks after the effective date of these rules. This certification shall also indicate that instructors have been informed that all students, teachers and visitors shall wear the devices when exposure to eye damage exists, as identified in these rules.

(2) An intermediate school district superintendent shall report to the state superintendent of public instruction by October 1 the names of those constituent school districts which are not in compliance with these rules. For the school year 1972-73, the report shall be made within 6 weeks after the effective date of these rules.

(3) The state superintendent of public instruction shall notify a school district in violation of these rules that it shall comply or show cause why compliance cannot be made within 30 days.

ACT NO. 54 OF THE PUBLIC ACTS OF 1972

ENROLLED SENATE BILL NO. 553

AN ACT to amend Act No. 269 of the Public Acts of 1955, entitled "The Michigan School Code", and to repeal certain acts and parts of acts, as amended, being sections 340.1 to 340.984 of the Compiled Laws of 1948, by adding section 585a.

The People of the State of Michigan enact:

Section 1. Act No. 269 of the Public Acts of 1955, as amended, being sections 340.1 to 340.984 of the Compiled Laws of 1948, is amended by adding section 585a to read as follows:

Sec. 585a. (1) Every pupil and teacher participating in a course mentioned in this section shall wear industrial quality eye protective devices, which have been sanitized prior to use, when exposure to danger exists while participating in such course. The board of education shall furnish the devices for pupils, teachers and visitors to the classrooms or laboratories. The courses for which protective devices are required are:

(a) Vocational or industrial arts shops or laboratories involving the use of or working with hot molten metals, milling, sawing, turning, shaping, grinding, cutting or stamping of any solid materials; heat treatment, tempering or kiln firing of any metal or other materials; gas or electric arc welding; repair or servicing of any vehicle; or caustic or explosive materials.

(b) Chemical or combined chemical-physical laboratory work involving acid, caustic or explosive chemicals or hot liquids or solids.

(2) "Industrial quality eye protective devices" means devices meeting the standards of the american standard safety code for head, eye and respiratory protection, Z87.1-1968, promulgated by the american standards association, incorporated.

(3) The provisions of this section shall be enforced pursuant to rules promulgated by the state board of education in accordance with and subject to Act No. 306 of the Public Acts of 1969, as amended, being sections 24.201 to 24.315 of the Compiled Laws of 1948.

Section 2. This amendatory act shall take effect September 1, 1972.

The following adapted from the:

NATIONAL STANDARD SCHOOL SHOP SAFETY INSPECTION CHECK LIST

Prepared by the Joint Safety Committee of the
AMERICAN VOCATIONAL ASSOCIATION — NATIONAL SAFETY COUNCIL

______________________________ Date______________

____

INTRODUCTION

A safe environment is an essential part of the school shop safety education program. The safe environment will exist only if hazards are discovered and corrected through *regular* and *frequent* inspections by school personnel—administrators, teachers and students. Safety inspections are to determine if everything is satisfactory.

Inspections may be made at the request of the board of education, the school administration or upon the initiative of the teacher. Some communities have drawn upon the cooperative service of professional safety engineers, inspectors of state labor departments, insurance companies and local safety councils to supplement and confirm inspections by school personnel.

The National Standard School Shop Safety Inspection Check List, recommended by the President's Conference on Industrial Safety is an objective inspection procedure for the school shop.

DIRECTIONS

WHO INSPECTS?

This will depend upon local policies. It is recommended, however, that shop teachers, and students—the student safety engineer and/or student safety committee—participate in making regular inspections. This not only tends to share responsibility but stimulates a broader interest in the maintenance of a safe school shop.

WHEN TO INSPECT?

As a minimum, a safety inspection should be made at the beginning of every school term or semester. More frequent inspections may be advisable.

HOW TO INSPECT?

Inspections should be well planned in advance.

Inspections should be systematic and thorough. No location that may contain a hazard should be overlooked.

Inspection reports should be clear and concise, but with sufficient explanation to make each recommendation for improvement understandable.

FOLLOW-UP

The current report should be compared with previous records to determine progress. The report should be studied in terms of the accident situation so that special attention can be given to those conditions and locations which are accident producers.

Each unsafe condition should be corrected as soon as possible in accordance with accepted local procedures.

A definite policy should be established in regard to taking materials and equipment out of service because of unsafe conditions.

The inspection report can be used to advantage as the subject for staff and class discussion.

CHECKING PROCEDURE

Draw a circle around the appropriate letter, using the following letter scheme:

S — Satisfactory (needs no attention)
A — Acceptable (needs some attention)
U — Unsatisfactory (needs immediate attention)

Recommendations should be made in all cases where a "U" is circled. Space is provided at the end of the form for such comments. Designate the items covered by the recommendations, using the code number applicable (as B-3).

In most categories, space is provided for listing of standards, requirements or regulations which have local application only.

A. GENERAL PHYSICAL CONDITION

1. Machines, benches, and other equipment are arranged so as to conform to good safety practices.......................... S A U
2. Condition of stairways.......................... S A U
3. Condition of aisles.......................... S A U
4. Condition of floors.......................... S A U
5. Condition of walls, windows, and ceiling.............. S A U
6. Illumination is safe, sufficient, and well placed....... S A U
7. Ventilation is adequate and proper for conditions..... S A U
8. Temperature control.......................... S A U
9. Fire extinguishers are of proper type, adequately supplied, properly located and maintained.......................... S A U
10. Teacher and pupils know location of and how to use proper type for various fires.......................... S A U
11. Number and location of exits is adequate and properly identified .... S A U
12. Proper procedures have been formulated for emptying the room of pupils and taking adequate precautions in case of emergencies S A U
13. Lockers are inspected regularly for cleanliness and fire hazards. S A U
14. Locker doors are kept closed.......................... S A U
15. Walls are clear of objects that might fall............ S A U
16. Utility lines are properly identified................. S A U
17. Teachers know the procedure in the event of fire including notification of the fire department and the evacuation of the building. S A U
18. Air in shop is free from excessive dust, smoke, etc.... S A U
19. ______________________________ S A U
20. ______________________________ S A U
21. ______________________________ S A U
22. ______________________________ S A U
23. Evaluation for the total rating of A. GENERAL PHYSICAL CONDITION .... S A U

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B. HOUSEKEEPING

1. General appearance as to orderliness................ S A U

2. Adequate and proper storage space for tools and materials. S A U

3. Benches are kept orderly........................... S A U

4. Corners are clean and clear......................... S A U

5. Special tool racks, in orderly condition, and provided at benches and machines.................................. S A U

6. Tool, supply, and/or material room is orderly........ S A U

7. Sufficient scrap boxes are provided.................. S A U

8. Scrap stock is put in scrap boxes promptly........... S A U

9. Materials are stored in an orderly and safe condition.. S A U

10. A spring lid metal container is provided for waste and oily rags. S A U

11. All waste materials and oily rags are promptly placed in the containers .... S A U

12. Containers for oily rags and waste materials are frequently and regularly emptied .... S A U

13. Dangerous materials are stored in metal cabinets..... S A U

14. Machines have been color conditioned................ S A U

15. Safety cans are provided for flammable liquids....... S A U

16. Bulk storage of dangerous materials is provided outside of the main building .... S A U

17. A toe-board or railing around a mezzanine used for storage or washing facilities .... S A U

18. Materials are stored in an orderly and safe condition on this mezzanine .... S A U

19. Flammable liquids are not used for cleaning purposes S A U

20. Floors are free of oil, water and foreign material..... S A U

21. Floors, walls, windows, and ceilings are cleaned periodically. S A U

22. ______________________________ S A U

23. ______________________________ S A U

24. ______________________________ S A U

25. ______________________________ S A U

26. Evaluation for the total rating for B. HOUSEKEEPING S A U

C. EQUIPMENT

1. Machines are arranged so that workers are protected from hazards of other machines, passing students, etc.................. S A U

2. Danger zones are properly indicated and guarded..... S A U

3. All gears, moving belts, etc., are protected by permanent enclosure guards .... S A U

4. All guards are used as much as possible.............. S A U

C. EQUIPMENT (continued)

5. All equipment control switches are easily available to operat S A

6. All machines are "locked off" when instructor is out of the ro S A

7. Brushes are used for cleaning equipment............. S A

8. Nonskid areas are provided around machines........ S A

9. Machines are in safe working condition.............. S A

10. Machines are guarded to comply with American Standards A sociation and local state code........................... S A

11. Adequate supervision is maintained when students are using m chines and dangerous tools.............................. S A

12. Tools are kept sharp, clean and in safe working order S A

13. All hoisting devices are in safe operating condition... S A

14. Machines are shut off while unattended.............. S A

15. Adequate storage facilities for tools, equipment, etc., not in im mediate use .... S A

16. ______________________________ S A

17. ______________________________ S A

18. ______________________________ S A

19. ______________________________ S A

20. Evaluation for the total rating for C. EQUIPMENT.. S A

D. ELECTRICAL INSTALLATION

1. All switches are enclosed............................ S A

2. There is a master control switch for all of the electrical installa tions .... S A

3. Electrical outlets and circuits are properly identified.. S A

4. All electrical extension cords are in safe condition and are n carrying excessive loads................................. S A

5. All machine switches are within easy reach of the operators. S A

6. Electrical motors and equipment are wired to comply with th National Electric Code.................................. S A

7. Individual cut-off switches are provided for each machine. S A

8. Machines are provided with overload and underload controls b magnetic pushbutton controls............................ S A

9. No temporary wiring in evidence..................... S A

10. ______________________________ S A

11. ______________________________ S A

12. ______________________________ S A

13. ______________________________ A

14. Evaluation for the total rating for D. ELECTR L IN STALLATION .... S A

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E. GAS

1. Gas flow to appliances is regulated, so that when appliance valve is turned on full, the flames are not too high............ S A U

2. Gas appliances are properly insulated with asbestos or other insulating material from tables, benches, adjacent walls, or other flammable materials .... S A U

3. No gas hose is used where pipe connections could be made. S A U

4. Gas appliances have been adjusted so that they may be lighted without undue hazard.................................. S A U

5. Students have been instructed when lighting gas appliances to light the match first before turning on the gas............ S A U

6. There are no gas leaks, nor is any odor of gas detectable in any part of the shop....................................... S A U

7. Shop instruction has been given concerning the lighting of gas furnaces operating with both air and gas under pressure.. S A U

8. When lighting the gas forge, goggles are worn....... S A U

9. When lighting the gas furnace, the following procedure is used: (a) light the match; (b) turn on the gas; (c) drop the match in the hole in top of the furnace............................ S A U

10. In shutting down the gas furnace, the gas valve is closed before the air valve.. S A U

11. ______________________________ S A U

12. ______________________________ S A U

13. ______________________________ S A U

14. ______________________________ S A U

5. Evaluation for the total rating for E. GAS.......... S A U

F. PERSONAL PROTECTION

1. Goggles or protective shields are provided and required for all work where eye hazards exist........................... S A U

2. If individual goggles are not provided, hoods and goggles are properly disinfected before use......................... S A U

3. Shields and goggles are provided for electric welding.. S A U

4. Rings and other jewelry are removed by pupils when working in the shop.. S A U

5. Proper kind of wearing apparel is worn and worn properly for the job being done.. S A U

6. Leggings, safety shoes, etc., are worn in special classes such as foundry, etc., when needed............................ S A U

7. Respirators are provided for dusty or toxic atmospheric conditions such as when spraying in the finishing room......... S A U

8. Provisions are made for cleaning and sterilizing respirators. S A U

9. Students are examined for safety knowledge ability.. S A U

10. Sleeves are rolled above elbows when operating machines. S A U

11. Clothing of students is free from loose sleeves, flopping ties, loose coats, etc. . . . . S A U

12. _____ S A U

F. PERSONAL PROTECTION (continued)

13. ______________________________ S A U

14. ______________________________ S A U

15. ______________________________ S A U

16. Evaluation for the total rating for F. PERSONAL PROTECTION. S A U

G. INSTRUCTION

1. Shop Safety is taught as an integral part of each teaching unit. S A U

2. Safety rules are posted particularly at each danger station. S A U

3. Printed safety rules are given each student.......... S A U

4. Pupils take a safety pledge........................ S A U

5. Use of a safety inspector.......................... S A U

6. Use of a student shop safety committee............... S A U

7. Use of safety contests...... .... S A U

8. Motion and/or slide films on safety are used in the instruction. S A U

9. Use of suggestion box.............................. S A U

10. Use of safety tests................................ S A U

11. Use of safety posters.............................. S A U

12. Talks on safety are given to the classes by industrial men. S A U

13. Tours are taken of industrial plants as a means of studying safety practices .... S A U

14. Periodic safety inspections of the shop are made by a student committee .... S A U

15. Men from industry make safety inspections of the shop S A U

16. Student shop safety committee investigates all accidents S A U

17. A proper record is kept of safety instructions which are given, preferably showing the signature of student on tests given in this area .... S A U

18. Rotate students on the Shop Safety Committee so that as many students as possible have an opportunity to participate... S A U

19. ______________________________ S A U

20. ______________________________ S A U

21. ______________________________ S A U

22. ______________________________ S A U

23. Evaluation for the total rating of G. INSTRUCTION S A U

H. ACCIDENT RECORDS

1. There is a written statement outlining the proper procedure when and if a student is seriously hurt........................ S A U

2. Adequate accident statistics are kept................ S A U

3. Accidents are reported to the proper administrative authority by the instructor .... S A U

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H. ACCIDENT RECORD (continued)

4. A copy of each accident report is filed with the State Department of Education .... S A U

5. Accident reports are analyzed for instructional purposes and to furnish the basis for elimination of hazards.............. S A U

6. ______________________________ S A U

7. ______________________________ S A U

8. ______________________________ S A U

9. ______________________________ S A U

10. Evaluation for the total rating of H. ACCIDENT RECORDS. S A U

I. FIRST AID

1. An adequately stocked first aid cabinet is provide S A

2. The first aid is administered by a qualified individual S A

3. The school has individuals qualified to administer first aid. S A

4. ______________________________ S A

5. ______________________________ S A

6. ______________________________ S A

7. ______________________________ S A

8. Evaluation for the total rating of I. FIRST AID.... S A

RECOMMENDATIONS

Code No.	

For additional copies in packets of 50 send $1.42 to National Safety Council, 444 North Michigan Avenue, Chicago, Ill. 60611.

Revd. 6/78
Rep. 10M57801

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C.I.P. PROGRAM DESCRIPTION

46.0000 Construction Trades

A summary of groups of instructional programs that prepare individuals to erect, install, maintain, and repair buildings, highways, airports, missile sites, and other structures using materials such as metal, wood, stone, brick, glass, concrete, and composition substances. Includes instruction in cost estimating; cutting, fastening, and fitting various materials; the use of hand and power tools; and in following technical specifications and blueprints.

Course 01 Construction - On-Site

An approved instructional program that prepares individuals in the accomplishment of the tasks for CIP Code 46.0000 where a product or service is rendered to certain private individuals or public sectors of the surrounding community. The most frequent products of this activity are residential housing units which are sold by the LEA or a third party. Included in this code are programs dealing specifically with residential house construction, modular home, or shed building where such units are sold at a set price or on a bid price system. This code also deals with renovation or add on types of construction where building supplies and/or materials are provided or donated for use in a permanent structure or product.

Course 02 Construction - In-School

An approved instructional program that prepares individuals in the accomplishment of the tasks for CIP Code 46.0000 utilizing the mock-up, build-up, teardown concept of instruction. Included in this definition would be programs specifically dealing with simulation of residential and commercial construction, in a school setting, with experience gained in wall building, wiring, roofing, masonry, concrete work, tools of the trade and all other skills which may be acquired in a classroom or laboratory setting. An in-school program is a higher cost program because the building materials are consumed on a one-time basis which necessitates the purchasing of significant materials for each section. The materials are not sold, but are utilized in the natural course of instruction.

46.0302 Electrician

An instructional program that prepares individuals to install, operate, maintain, and repair electrically-energized systems such as residential, commercial, and industrial electric-power wiring, and D.C. and A.C. motors, controls, and electrical-distribution panels. Includes instruction in the use of test equipment.

VOCATIONAL COOPERATIVE EDUCATION

Definition

"The term 'cooperative education' means a program of vocational education for persons who, through written cooperative arrangements between the school and employers, receive instruction, including required academic courses and related vocational instruction by alternation of study in school with a job in any occupational field, but these two experiences must be planned and supervised by the school and employers so that each contributes to the student's education and to his or her employability. Work periods and school attendance may be on alternate half days, full days, weeks, or other periods of time in fulfilling the cooperative program." (P.L. 94-482)

Responsibilities of School District

The local school district must meet all the Federal requirements of P.L. 94-482, Section 122; 45 CFR 104.531 through 104.533 and the State of Michigan Statutes and General School Laws listed below:

A. IT IS A PROGRAM OF VOCATIONAL EDUCATION.

"Vocational program" means laboratory, simulation or instruction based upon individually designed learning experiences in a vocational subject preparing the student for competencies required in a recognized occupation coded in accordance with the most recent vocational education listing of programs by the United States Department of Education.

B. THERE IS A WRITTEN AGREEMENT BETWEEN THE SCHOOL AND EMPLOYERS.

The Youth Employment Standards Act (P.A. 90 of 1978) governs the legal employment of minors in Michigan. In section 18 of the Act, a provision is made to allow a written agreement, or contract, to be entered into between an employer and the board of education of the school district, in which the minor is enrolled. This written agreement exempts a student from obtaining a work permit and allows the student to be legally employed in Michigan. The employment, however, shall not be in violation of a Federal Statute or regulation and a signed copy of the agreement shall be on file in the place of employment before a minor begins employment. The training agreement, in cooperative education, is the legal written agreement developed cooperatively between the employer, teacher-coordinator, student, and parent and outlines the responsibilities of the employer and student to the program and establishes the legal conditions of the student-learner's employment.

C. THERE IS INSTRUCTION (INCLUDING REQUIRED ACADEMIC INSTRUCTION) IN SCHOOL RELATED TO THE JOB IN ANY OCCUPATIONAL AREA.

The program is of sufficient duration to develop competencies necessary to prepare the learner for employment. It provides a coordinated instructional program combining supervised part-time employment and classroom instruction related to the learner's job. Related vocational instruction for cooperative education enrollees shall be scheduled weekly.

D. THE ALTERNATION OF STUDY AND WORK ARE PLANNED AND SUPERVISED BY THE SCHOOL AND EMPLOYER IN ORDER TO FURTHER THE STUDENT'S EDUCATION AND EMPLOYABILITY.

The student-learner shall be employed for an average of not less than 15 hours per week during the effective time of the individual's program. The school shall have the responsibility of providing coordination and supervision services during such time.

E. STUDENTS ARE EMPLOYED AND COMPENSATED IN CONFORMITY WITH FEDERAL, STATE AND LOCAL LAWS.

The program provides cooperative on-the-job training that (1) employs and compensates student-learners in conformity with Federal, State, and local laws and regulations and in a manner not resulting in exploitation of the student-learner for private gain, and (2) is conducted in accordance with written training agreements between local education agencies and employers.

References

Individuals requiring additional information pertaining to cooperative education principles and practices are asked to consult the Michigan Department of Education, Vocational-Technical Education Service, developed Cooperative Education Handbook available in September of 1981.

WORK EXPERIENCE

PAID WORK EXPERIENCE

Definition

Paid work experience programs are school-sponsored and supervised employment programs. Students are allowed to earn academic credit while employed in the community. The employment serves as a means of acquiring desirable work habits and attitudes towards the world of work. The employment is not necessarily related to a student's career interest and enrollment in a related vocational education program is not required.

Objectives

Paid work experience programs are designed to provide students an opportunity to:

1. Foster positive attitudes about work, school and society
2. Promote an understanding in the dignity of work
3. Develop a student's ability to understand and function in an employer-employee relationship
4. Earn wages to remain in school
5. Experience an alternative to the traditional school program

Guidelines

1. Written work agreements should be completed between the employer, student, parent and school
2. Written work agreements should be completed in conformance to all Federal, State and local laws, rules and regulations; including non-discrimination against any student because of race, color, sex, national origin or ancestry. This policy of non-discrimination shall also apply to otherwise qualified handicapped individuals
3. Related academic instruction, where possible, should be provided
4. A school work experience coordinator should be provided to serve as a liaison between the student, employee, parents and school officials
5. Academic credit should be awarded for participation in the program

Funding

The Michigan Department of Education, the Vocational-Technical Education Service does not fund paid work experience programs.

UNPAID WORK EXPERIENCE

Definition

Unpaid work experience is a school sponsored and supervised instructional technique used in vocational education programs in which students are placed with an employer for a limited time and are not compensated during the duration of the experience.

Objectives

Unpaid work experience programs are designed to provide students with an opportunity to:

1. Receive on-site exposure to various businesses and industries while participating in a related vocational education program
2. Develop a realistic understanding of the relationship between education and the world of work
3. Enhance a positive self-image
4. Assist in the selection of occupational choices
5. Expand learning opportunities by using community resources

Guidelines

1. The training, even though it includes actual operation of the facilities of the participating employer is similar to that given in a vocational school
2. The training is for the benefit of the trainee
3. The trainee does not displace a regular employee, but does work under a regular employee's close observation
4. The participating employer does not derive an immediate advantage from the activities of the trainee
5. The trainee is not necessarily entitled to a job at the conclusion of the training period
6. The trainee is not entitled to wages for the time spent in the training
7. The training is for not more than 45 hours with a participating employer during each school semester
8. The training is conducted under a written work experience training agreement between the school district and the participating employer

Funding

The Michigan Department of Education, the Vocational-Technical Education Service does not fund unpaid work experience but considers it to be an allowable instructional activity under a given vocational education program.

WORK EXPERIENCE AND CAREER EXPLORATION PROGRAM
(W.E.C.E.P.)

I. Definition

The Work Experience and Career Exploration Program (W.E.C.E.P.) is a school-supervised and administered program that includes part-time work as an integral part of an educational program aimed at motivating 14 and 15 year-old youth toward education and preparing them for the world of work.

II. Program Objectives

There are several objectives of a W.E.C.E.P. program:

A. To provide a career-oriented educational program for dropout prone youth to become oriented and motivated toward education and the world of work.

B. To increase the desire to learn and improve educational performance.

C. To develop a greater degree of self-confidence, responsibility and aid in the maturation process of the student participants.

D. To provide student participants with on-the-job learning experiences that are in harmony with their interests, needs and objectives.

E. To improve school adjustment of student participants for whom the traditional curriculum is found to be inadequate.

F. To promote personal and social adjustment of the student participants and establish emotional stability through a feeling of being engaged in worthwhile activity.

III. Instructional Content

W.E.C.E.P. programs are planned so as to include part-time work supervised by employers and school personnel, as an integrated part of the enrollee's educational program. Students receive work experience on jobs permitted or approved under Federal or State laws. Students are in class with a W.E.C.E.P. teacher-coordinator for job-related and occupational safety, including needed individualized or remedial instruction. Students also receive a minimum of 20 hours of instruction on the Michigan Occupational Information System (MOIS) and a minimum of 30 hours of employability skills instruction. The students' employment is under the supervision of W.E.C.E.P. teacher-coordinators and employers. Students receive all State required courses necessary for graduation. The W.E.C.E.P. program is planned so that the students' individual academic achievement potential is recognized.

IV. Program Organization

The Vocational-Technical Education Service, Michigan Department of Education requires that W.E.C.E.P. programs in local districts meet the following criteria:

A. Eligibility. Any student aged 14 or 15 years, whom authoritative local school personnel identify as being able to benefit from the program, shall be eligible to participate.

B. Credits. Students shall receive school credits for both in-school related instruction and on-the-job experience.

C. Size. Each program unit shall consist of 12 to 25 students to one W.E.C.E.P. teacher-coordinator.

D. Instructional Schedule. W.E.C.E.P. students will spend a minimum of four periods daily in classroom instruction including one period of 180 hours of instruction devoted to job-related and employability skill instruction, safety and career exploration. Each student will have a minimum of 20 hours of career exploration utilizing the Michigan Occupational Information System (MOIS) and have a minimum of 30 hours of instruction in employability skills training. The employability skills training will equal or exceed the employability skills performance objectives adopted, as part of Michigan Vocational-Technical Service programs. Each local district submitting a letter of application to operate a W.E.C.E.P. program will furnish to the Vocational-Technical Education Service a course outline for the related class.

E. W.E.C.E.P. Teacher-Coordinator. Each program unit shall be under the supervision of a school official to be designated for the purpose of the program as a W.E.C.E.P. teacher-coordinator, who shall generally supervise the program and coordinate the work and education aspects of the program and make regularly scheduled visits to the work stations.

F. Written W.E.C.E.P. Training Agreement. No student shall participate in the program until there has been made a written E.E.C.E.P. training agreement signed by the W.E.C.E.P. teacher-coordinator, the employer and the student. The agreement shall also be signed or otherwise consented to by the student's parent or guardian. The W.E.C.E.P. training agreement will detail job tasks and related in-school instruction. A sample W.E.C.E.P. training agreement will be submitted annually by the local district to the Vocational-Technical Education Service.

G. Provision for Health and Well-Being. Employment under W.E.C.E.P. will not interfere with the schooling of the minors or with their health and well-being.

H. Records and Reports. The names and addresses of each school and the names and addresses of each employer enrolling work experience and career exploration program students and the number of enrollees in each unit shall be kept at the Vocational-Technical Education Service's office. A copy of the written W.E.C.E.P. training agreement for each student participating in the program shall be kept in the local educational office. The records required (for this paragraph) shall be kept for a period of three years from the date of enrollment in the program and shall be made available for inspection or transcription to the representatives of the Administrator of the Wage and Hour Division. Each school district operating a W.E.C.E.P. program shall submit an annual evaluative report by June 30th, which details the results of the W.E.C.E.P. program in terms of attendance and tardiness patterns, grade point average trends and dropout statistics of the enrollees. Based on a favorable state agency evaluation, a local district will be approved on an annual basis to operate a W.E.C.E.P. program. Under no circumstances can a local district operate a W.E.C.E.P. program without first obtaining written state agency approval for the program.

I. Approved Occupations. Employment of minors enrolled in a W.E.C.E.P. program approved pursuant to the requirements of this section shall be permitted in all occupations except the following:

1. Manufacturing and mining.

2. Occupations declared to be hazardous for the employment of minors between 16 and 18 years of age in Subpart E of Part 570 Child Labor Regulations, Orders and Statements of Interpretation of the Federal Fair Labor Standards Act, and occupations in agriculture declared to be hazardous for employment of minors below the age of 16 in Subpart E-1 of this part.

3. Occupations other than those permitted under sections 570.33 and 570.34 except upon approval of a variation in individual cases or classes of cases by the Administrator of the Wage and Hour Division after notice to interested persons and opportunity to be heard.

Employment of minors enrolled in a W.E.C.E.P. program approved pursuant to the requirements of this section shall be confined to not more than 23 hours in any week when school is in session and not more than three hours in any day when school is in session, any portion of which may be during school hours.

Employment of W.E.C.E.P. participants must not have the effect of displacing a worker in the establishment of the employer. Participants in W.E.C.E.P. must be paid according to the statutory minimum wage provision of the Fair Labor Standards Act.

V. Approval of Local Programs

Local school districts desiring approval to operate a W.E.C.E.P. program must submit an annual letter of application by June 30th to the

Michigan Department of Education
Vocational-Technical Education Service
Secondary Unit
Box 30009
Lansing, MI 48909
(517) 373-3365

VOCATIONAL WORK-STUDY

Definition and Purpose

The vocational work-study program is for those students who are in need of earnings from employment in order to commence or continue their vocational education programs.

Administration

The work-study program shall be administered by local educational agencies and made available, to the extent of available funds, to all qualified youth, in the area served by such agencies, who meet requirements.

Eligible Students

Employment under the work-study program shall be furnished only to a student who (a) has been accepted for enrollment or, if already enrolled, is in good standing and in full time attendance as a full-time student in a vocational education program which meets the standards of the state board and of the local educational agency and the requirements of the state plan, (b) is in need of the earnings from such employment to commence or continue a vocational education program, and (c) is at least 15 years of age and less than 21 years of age at the date of commencement of employment and is capable in the opinion of the appropriate school authorities of maintaining good standing in a school program while employed under the work-study program.

Limitation of Hours and Compensation of Employment

No student shall be employed under a vocational work-study program for more than 20 hours in any week in which classes in which the student is enrolled are in session. Summer employment shall not exceed 40 hours per week.

Employers

Employment under work-study programs shall be for the local educational agency or for some other public agency or institution, federal, state, or local and work so performed shall be adequately supervised and coordinated and shall not supplant present employees of such agency or institution who ordinarily perform such work. In those instances where employment under work-study programs is for a federal agency or institution, the written arrangement between the local educational agency and the federal agency or institution shall state that students so employed are not federal employees for any purpose.

Amounts Spent for Employment

In each fiscal year during which the work-study program remains in effect, the local educational agency shall expend for employment of its students an amount in state and/or local funds that is not less than the average annual expenditure for work-study programs of a similar nature during the three fiscal years preceding in which the supplementary plan provisons for its work study program are approved.

Applications, Priorities, and Approval

Work-study programs shall be approved on an individual basis by the state board and shall be consistent with the policies and procedures set forth.

Applications by Local Educational Agencies

Local educational agencies shall submit project proposals to the state board staff for approval in a manner similar to other vocational education programs.

Priority of Projects

Work-study programs will be provided, insofar as financial resources are available, for the undertaking of such programs in the order determined by the application of criteria for determining relative priority of projects which shall include preference for local educational agencies serving communities having substantial numbers of dropouts and unemployed youths and may include other relevant factors such as the extent to which the local educational agencies are using guidance and counseling and other related services designed to achieve the purposes of the work-study program.

ELECTRICAL
JOB TITLES

D.O.T.	JOB TITLE
824.261-010	Electrician
829.684-022	Electrician's Helper

DUTY/TASK - JOB MATRIX

DUTY/TASK NUMBER	JOB TITLE																

TASK LIST
FOR
ELECTRICITY

A. COMPUTING SERVICE LOADS

1. Balance the total load per phase using appropriate materials to determine proper load balance.

2. Calculate individual circuit load using appropriate materials to determine proper circuit loads.

3. Determine how many convenience and appliance outlets should be on each separate circuit using appropriate materials to assure proper balance of load.

4. Compute the size of service entrance conductors using appropriate materials to assure adequate conductor size.

B. INSTALLING SERVICE ENTRANCE

1. Install main service panel using appropriate tools and equipment to establish a panel location.

2. Install circuit breakers in panel using appropriate tools and equipment to provide individual circuit beginning.

3. Install main service disconnect using appropriate tools and equipment to disconnect all unground service entrance conductors.

4. Ground service entrance equipment using appropriate tools and equipment to provide adequate grounding.

5. Install mast-type (through the roof) service entrance using appropriate tools and equipment to provide service access.

6. Install service entrance cable to service drop using appropriate tools and equipment to provide conductors.

7. Install temporary electrical service using appropriate tools and equipment to provide a source for temporary electrical power.

8. Install underground electrical service using appropriate tools and equipment to provide a source for electrical power.

9. Install/connect mobile home service, using appropriate tools and equipment to provide electrical power.

C. INSTALLING SWITCH BOXES AND OUTLET BOXES

1. Install bar-hanger using appropriate tools and equipment to support square or octagon outlet boxes.

C. INSTALLING SWITCH BOXES AND OUTLET BOXES (continued)

2. Install flush mount junction box using appropriate tools and equipment to provide for cable or wire splices.

3. Install gangable boxes using appropriate tools and equipment to allow mounting of switches and/or receptacles.

4. Install octagon outlet box using appropriate tools and equipment to allow for cable splices or switch and receptacle mounting.

5. Install surface mount junction box using appropriate tools and equipment to provide space for cable splicing.

6. Install outlet boxes for receptacles and switches in existing wall using appropriate tools and equipment to allow for mounting of switches and/or receptacles.

7. Install recessed fixture housing in ceiling using appropriate tools and equipment to mount lighting fixture.

8. Install flush mount switch and outlet box in a dry wall, lath, plaster, or paneled wall using appropriate tools and equipment to provide for mounting of switches and/or receptacles.

9. Install flush mount switch and outlet boxes in a masonry wall using appropriate tools and equipment to provide for mounting of switches and/or receptacles.

10. Install underground, watertight, cast iron box using appropriate tools and equipment to provide waterproof space for cable splices.

D. ROUGHING IN FEEDERS, BRANCH CIRCUIT CABLES, AND CIRCUITS

1. Rough in armored cable to outlet box using appropriate tools and equipment to provide current to switches and/or receptacles.

2. Install non-metallic cable in outlet boxes using appropriate tools and equipment to provide current to switches and/or receptacles.

3. Rough in cable or conduit for branch circuits using appropriate tools and equipment to deliver current to outlet or junction boxes.

4. Rough in circuit using appropriate tools and equipment for two three-way switches with feed to the switchbox.

5. Rough in a circuit using appropriate tools and equipment for two three-way switches with feed to the controlled device.

6. Rough in a circuit using appropriate tools and equipment for two three-way and one four-way switch with feed to a three-way switch.

7. Rough in a circuit using appropriate tools and equipment for two three-way and one four-way switch with feed to the controlled device.

D. ROUGHING IN FEEDERS, BRANCH CIRCUIT CABLES, AND CIRCUITS (continued)

8. Rough in a circuit using appropriate tools and equipment for two three-way and two four-way switches with feed to a three-way switch.

9. Rough in cables using appropriate tools and equipment for a single-pole switch with feed to the switch.

10. Rough in cables using appropriate tools and equipment for a single-pole switch with feed to the controlled device.

11. Rough in a circuit using appropriate tools and equipment for a single-pole switch with feed to the last device on the line.

12. Rough in a circuit using appropriate tools and equipment for a split circuit duplex receptacle.

13. Rough in two duplex receptacle circuits using appropriate tools and equipment with two three-way switches controlling one-half of each receptacle.

14. Rough in 120 or 240 volt circuits to distribution panel using non-metallic sheathed cable (N.M.C.) using appropriate tools and equipment to provide for connection of circuits to protection devices.

15. Rough in cable between an existing box and newly installed box using appropriate tools and equipment to provide current to new box.

16. Rough in circuit using conduit and 4" square boxes with plaster rings for two three-way switches controlling one device.

17. Rough in a circuit using appropriate tools and equipment to provide current to a door chime system.

18. Rough in a circuit using appropriate tools and equipment to provide current for an intercom system.

19. Rough in wiring using appropriate tools and equipment to provide current for a line-voltage thermostat.

20. Rough in wiring using appropriate tools and equipment to provide current for a low-voltage thermostat.

21. Install conduit underground using appropriate tools and equipment to provide a waterproof wire and/or cable way.

22. Rough in direct burial cable using appropriate tools and equipment to provide current to a remote device.

23. Splice two or more conductors using crimp-type connector to provide for continuity of a circuit.

D. ROUGHING IN FEEDERS, BRANCH CIRCUIT CABLES, AND CIRCUITS (continued)

24. Splice two conductors using a pigtail splice to provide for continuity of a circuit.

25. Splice two or more conductors using mechanical connectors to provide for continuity of a circuit.

26. Run feeder cable from main service panel to auxiliary panel using appropriate tools and equipment to feed auxiliary panel.

E. TRIMMING OUT (FININSHING) ELECTRICAL DEVICES AND APPLIANCES

1. Connect/install duplex receptacle outlets using appropriate tools and equipment to provide a useable outlet.

2. Connect single pole switch using appropriate tools and equipment to provide current to one or more electrical devices.

3. Connect/install single pole switch with pilot light using appropriate tools and equipment to provide current to one or more electrical devices.

4. Connect/install three-way switches using appropriate tools and equipment to provide current to one or more electrical devices.

5. Connect/install four-way switches using appropriate tools and equipment to provide current to one or more electrical devices.

6. Connect split circuit duplex receptacle using appropriate tools and equipment to provide two-circuit control.

7. Connect/install three-wire 220 volt receptacle using appropriate tools and equipment to provide current for plug-in devices.

8. Connect/install four-wire 220 volt receptacles using appropriate tools and equipment to provide current for plug-in devices.

9. Install/connect ground fault interrupting device using appropriate tools and equipment to provide protected circuit in outdoor, kitchen, or bathroom locations.

10. Connect recessed fixture box in ceiling using appropriate tools and equipment to be flush and anchored to provide adequate lighting level.

11. Connect wires from junction box to appliance using appropriate tools and equipment to supply current to direct-wired device.

12. Connect/install emergency warning system using appropriate tools and equipment to provide for fire and/or security protection.

13. Install/connect hot water heater using appropriate tools and equipment to provide proper voltage and amperage to heater.

E. TRIMMING OUT (FINISHING) ELECTRICAL DEVICES AND APPLIANCES (continued)

14. Connect/install humidity control device using appropriate tools and equipment to electrically regulate home/commercial moisture level.

15. Connect intercom system using appropriate tools and equipment to provide for intra-structure communications.

16. Connect low-voltage lighting control using appropriate tools and equipment to provide for adequate lighting levels.

17. Connect moisture resistant receptacle using appropriate tools and equipment to provide safe connection means in wet locations.

18. Install/connect photo-electric cell control using appropriate tools and equipment to provide light-sensitive device control.

19. Connect/install delayed action or time switch using appropriate tools and equipment to provide device control.

20. Connect water pump motor using appropriate tools and equipment to provide adequate water supply.

21. Install surface raceway using appropriate tools and equipment to provide circuit path for electrical devices.

22. Install/connect automatic garage door operator using appropriate tools and equipment to allow vehicle operated operation.

23. Connect de-icing equipment using appropriate tools and equipment to provide ice-free surfaces.

24. Connect door chime system using appropriate tools and equipment to allow for at least two-point operation.

25. Connect/install electric fence charger using appropriate tools and equipment to restrain livestock or predators.

26. Connect 120/240 circuits to circuit breaker panel using non-metallic cable to provide circuit over-current protection.

F. INSTALLING LIGHTING FIXTURES

1. Connect/install post lights using appropriate tools and equipment to provide for exterior lighting.

2. Install/connect fan controlled by switch using appropriate tools and equipment to allow fan to be switched on and off remotely.

3. Connect/install flood lights using appropriate tools and equipment to provide for utilitarian lighting of the exterior.

F. INSTALLING LIGHTING FIXTURES (continued)

4. Connect/install lighting dimmer system using appropriate tools and equipment to obtain various lighting levels from one fixture.
5. Install/connect heat-a-vent light using appropriate tools and equipment to provide for extra heating and ventilation in bathrooms.
6. Connect/install light fixture using appropriate tools and equipment to provide light.
7. Install/connect photo-electric control on a light using appropriate tools and equipment to provide unique control of light other than normal switch.
8. Install/connect power failure lighting using appropriate tools and equipment to provide for emergency lighting.
9. Install/connect moisture resistant fixtures using appropriate tools and equipment to comply with industrial standards.
10. Install/connect pilot light using appropriate tools and equipment to show when appliance is on.

G. INSTALLING ELECTRICAL ENVIRONMENTAL CONTROL COMPONENTS

1. Connect/install baseboard heat unit using appropriate tools and equipment to provide heat.
2. Connect ceiling heat cable to thermostat using appropriate tools and equipment to allow heat cable output to be controlled.
3. Connect central electric heat using appropriate tools and equipment to provide heat.
4. Connect furnace motor using appropriate tools and equipment to comply with industry standards.
5. Connect/install gas or oil fired heating unit using appropriate tools and equipment to provide heat.
6. Connect line voltage thermostat using appropriate tools and equipment to provide for regulation of heat.
7. Connect low voltage thermostat using appropriate tools and equipment to regulate heat output.
8. Connect/install wall heater using appropriate tools and equipment to provide for heat.
9. Install ceiling heat cable using appropriate tools and equipment to provide heat.

H. MAINTAINING EXISTING WIRING

1. Diagnose/repair flourescent fixture using appropriate tools and equipment to provide light.
2. Diagnose and repair/replace lights using appropriate tools and equipment to provide light.
3. Repair/replace relays and timers using appropriate tools and equipment to make functional.
4. Repair water heater using appropriate tools and equipment to make functional.
5. Install and maintain emergency lighting using appropriate tools and equipment to provide light in emergency.
6. Repair or replace frayed service cords using appropriate tools and equipment to restore function.
7. Replace existing interior load center using appropriate tools and equipment to restore function.
8. Replace cable using appropriate tools to restore function.
9. Replace circuit breakers using appropriate tools and equipment to restore service.
10. Replace existing receptacle or switch using appropriate tools and equipment to restore to function.
11. Replace fuses using appropriate tools and equipment to restore function.
12. Replace grounding electrode conductor using appropriate tools and equipment to restore function.
13. Replace pilot light bulb using appropriate tools and equipment to restore function.
14. Replace service entrance using appropriate tools and equipment to restore function.
15. Replace transformer using appropriate tools and equipment to restore function.
16. Service electric motors using appropriate tools and equipment to restore function.
17. Test for correct voltage using appropriate tools and equipment to determine voltage level.
18. Troubleshoot a branch circuit using appropriate tools and equipment to determine a problem.

I. USING EMPLOYABILITY SKILLS

1. Investigate employment information using sources of employment information to identify employment opportunities.

2. Identify job requirements using health, physical, legal, education, and other occupational information to determine the requirements of an occupation.

3. Acquire wage information using available resources to determine the approximate entry wages, general wage range, and significant fringe benefits for an occupation.

4. Identify significant non-wage job characteristics using available resources to determine shift requirements, union affiliation, apprenticeships, occupational hazards, characteristics of work environment and other significant job factors.

5. Explore employment opportunities using available resources to describe local, regional, and national employment opportunities for an occupation.

6. Analyze career ladder using available resources to describe job progression in an occupation.

7. Identify personal criteria with information about available alternatives using a decision-making situation and procedures and skills in decision-making to choose a job, further training or other alternatives.

8. Prepare a resume using personal information to apply for a job.

9. Write a letter of application using personal notes to apply/inquire about a job.

10. Complete a job application using personal notes to apply for a job.

11. Demonstrate appropriate dress using a knowledge of job requirements to comply with standards of on-the-job dress and grooming.

12. Complete a job interview using communication and interpersonal skills to become employed.

13. Describe personal criteria using references to identify acceptable job offers.

14. Demonstrate interpersonal skills to achieve successful relationships with others.

15. Identify source of continuing education for an occupation using available resources to identify career ladder alternatives.

16. Describe job termination procedures using a knowledge of the occupational area to leave a particular job.

Duty: Computing Service Loads	**Duty No.** A **Task No.** 1

Task: Balance the total load per phase using appropriate materials to determine proper load balance.

Achievement Indicators: The learner:

	Yes	No
1. Omitted all 240 volt circuits from calculations, i.e., range, water heater, central heats, and air -	____	____
2. Made a list of all 120 volts circuits -	____	____
3. Determined the wattage of all appliances being used or to be installed from the manufacturer's data plate -	____	____
4. Calculated the wattage total per circuit -	____	____
5. Divided the total wattage per circuit by the voltage of the circuit to get the ampere per circuit -	____	____
6. Loaded each phase with an equal number of 120 volt circuits based on amperage -	____	____
7. Totaled each phase -	____	____
8. Compared totals to determine degree of balance -	____	____
9. Redistributed 120 volt loads on phases if they did not balance -	____	____

Criteria: Competence in the task will be recognized when the work meets the National Electrical Code standards.

Tools and Equipment:	**Resources:**

Duty: Computing Service Loads

Duty No. A

Task No. 2

Task: Calculate individual circuit load using appropriate materials to determine proper circuit loads.

Achievement Indicators: The learner:

	Yes	No
1. Made a list of all possible equipment that is used at one time on an individual circuit -	____	____
2. Determined the wattage of all appliances being used or to be installed from the manufacturer's data place -	____	____
3. Totaled the wattage on that line -	____	____
4. Divided the total wattage by the applied voltage to get the total amperage for the circuit load -	____	____
5. Allowed 1 1/2 amps per outlet for light and convenience outlets that were not calculated as above -	____	____

Criteria: Competence in the task will be recognized when the work is done according to the National Electrical Code and local codes.

Tools and Equipment:

Resources:

Duty: Computing Service Loads

Duty No. A

Task No. 3

Task: Determine how many convenience and appliance outlets should be on each separate circuit using appropriate materials to assure proper balance of load.

Achievement Indicators: The learner:	Yes	No
1. Allocated a minimum number of appliance circuits -	____	____
2. Chose each circuit and followed the procedure below for determining the number of receptacle outlets required -	____	____
a. Determined the individual branch circuit amperages -	____	____
b. Took 80% of total branch circuit amperages -	____	____
c. Divided the answer in step b by 1.5 to determine the number of outlets per circuit -	____	____
3. Identified required convenience/appliance outlets per circuit -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements as outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Computing Service Loads	**Duty No.** A **Task No.** 4

Task: Compute the size of service entrance conductors using appropriate materials to assure adequate conductor size.

Achievement Indicators: The learner:

	Yes	No
1. Calculated the general lighting load -	____	____
2. Calculated the number of branch circuits required and their load -	____	____
3. Calculated the small appliance load -	____	____
4. Calculated the laundry load -	____	____
5. Calculated the total circuit load without major appliances -	____	____
6. Calculated the circuit loads of major appliances -	____	____
7. Totaled all circuit wattage load for the total wattage of the house -	____	____
8. Divided the total wattage by the applied votage to get the total amperes. Derated according to Chapter 9, National Electrical Code -	____	____
9. Determined the total amperes for the load, and used appropriate table from the National Electrical Code and determined entrance cable size -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements as outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Service Entrance	**Duty No.** B **Task No.** 1

Task: Install main service panel using appropriate tools and equipment to establish a panel location.

Achievement Indicators: The learner:

	Yes	No
1. Located main service panel as near to the point of service entrance as possible -	____	____
2. Located height of main disconnecting means from floor level as required by the National Electrical Code -	____	____
3. Removed knockout from main service panel -	____	____
4. Marked hole for raceway -	____	____
5. Cut hole through storm sheathing 1/2" larger than circle drawn for knockout -	____	____
6. Installed raceway from point of entrance to main service panel -	____	____
7. Attached service panel to structure -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Service Entrance

Duty No. B

Task No. 2

Task: Install circuit breakers in panel using appropriate tools and equipment to provide individual circuit beginning.

Achievement Indicators: The learner:

	Yes	No
1. Checked breaker size and type to insure that the breaker was suitable for use in panel - -	____	____
2. Inserted breaker in breaker box -	____	____
3. Assured continuity with VOM -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements as outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Service Entrance	**Duty No.** B **Task No.** 3

Task: Install main service disconnect using appropriate tools and equipment to disconnect all unground service entrance conductors.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point for the main service disconnect -	____	____
2. Attached the main service disconnect to the building structure -	____	____
3. Attached feed cables into main service disconnect -	____	____
4. Connected service conductors to the line lugs of the disconnect -	____	____
5. Connected load conductors to load lugs of the disconnect -	____	____
6. Terminated load conductors at load being served -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements as outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Service Entrance	**Duty No.** B **Task No.** 4

Task: Ground service entrance equipment using appropriate tools and equipment to provide adequate grounding.

Achievement Indicators: The learner:	Yes	No
1. Removed meter base cover -	____	____
2. Located all installation points -	____	____
3. Applied corrosive inhibitor if required by authority having jursidiction -	____	____
4. Terminated grounding conductor at point designated by the authority having jurisdiction -	____	____
5. Drove ground rod or buried grounding electrode -	____	____
6. Fastened ground wire to grounding electrode with a clamped approved for direct burial -	____	____
7. Attached wire to surface of structure -	____	____
8. Extended the grounding conductor to the water pipe if there was a metal water system installed -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements as outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Service Entrance

Duty No. B

Task No. 5

Task: Install mast-type (through the roof) service entrance using appropriate tools and equipment to provide service access.

Achievement Indicators: The learner:	Yes	No
1. Requested power supplier to spot meter base -	____	____
2. constructed a vertical line to the roof overhand from meter base -	____	____
3. Located center of hole on soffit board -	____	____
4. Bored a hole slightly larger than conduit -	____	____
5. Installed conduit through roof down to meter base -	____	____
6. Tightened conduit into hub of meter base -	____	____
7. Fastened conduit to wall with rigid conduit straps -	____	____
8. Installed roof flange around conduit, secured to roof -	____	____
9. Ran service entrance conductors down to meter base and left enough of free conductor from top of conduit to meet local requirements -	____	____
10. Connected service entrance conductors to line lugs of meter base and tightened securely -	____	____
11. Ran conductors from load lugs of meter base to disconnect in main service panel -	____	____
12. Installed weatherhead with one wire per hole in weatherhead -	____	____
13. Sealed with waterproof sealant where conduit entered soffit board -	____	____
14. Tested service entrance conductors for shorts or frounds -	____	____

Criteria:	Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Service Entrance	**Duty No.** B **Task No.** 6

Task: Install service entrance cable to service drop using appropriate tools and equipment to provide conductors.

Achievement Indicators: The learner:	Yes	No
1. Removed meter base cover -	_____	_____
2. Attached cable to line side of meter base using connectors -	_____	_____
3. Attached cable to surface of structure -	_____	_____
4. Connected cable to line lugs of meter base -	_____	_____
5. Terminated upper end of cable above termination of service proper -	_____	_____
6. Provided sufficient cable to form drip loop -	_____	_____
7. Replaced meter base cover -	_____	_____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Service Entrance

Duty No. B

Task No. 7

Task: Install temporary electrical service using appropriate tools and equipment to provide a source for temporary electrical power.

Achievement Indicators: The learner:	Yes	No
1. Requested power supplie- to approve the proposed location -	____	____
2. Laid pole on ground -	____	____
3. Marked off the depth the pole goes in the ground -	____	____
4. Attached meter base five to six feet above ground level -	____	____
5. Installed raceway or service cable from meter base to top of service pole -	____	____
6. Attached raceway to service pole -	____	____
7. Installed weatherhead -	____	____
8. Installed raceway between meter base and main service panel -	____	____
9. Attached service panel to pole -	____	____
10. Installed conduit from waterproof receptacle box(es) to service panel -	____	____
11. Attached receptacle box to pole -	____	____
12. Ran all wiring and made wiring connections -	____	____
13. Installed ground fault protection -	____	____
14. Ran ground wire and fastened to pole down to ground level -	____	____
15. Dug hole for service pole -	____	____
16. Installed service pole and tamped dirt back tightly -	____	____
17. Drove ground rod or buried grounding electrode -	____	____

The learner:	Yes	No
18. Fastened ground wire to ground rod or grounding electrode with approved device -	____	____
19. Installed pole reinforcement as required -	____	____
20. Had installation inspected -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Service Entrance

Duty No. B

Task No. 8

Task: Install underground electrical service using appropriate tools and equipment to provide a source for electrical power.

Achievement Indicators: The learner:	Yes	No
1. Requested power supplier to spot meter base location -	____	____
2. Attached meter base to structure -	____	____
3. Opened a trench from local power company pole to a point under meter base -	____	____
4. Installed conduit from meter base to a point near the bottom of the trench -	____	____
5. Installed plastic bushing on bottom of conduit -	____	____
6. Fastened required lengths of conduit together -	____	____
7. Prepared required raceway for conductors at pole -	____	____
8. Requested inspection -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Service Entrance	**Duty No.** B **Task No.** 9

Task: Install/connect mobile home service, using appropriate tools and equipment to provide electrical power.

Achievement Indicators: The learner:	Yes	No
1. Requested power company representative to field check site before wiring began -		
2. Obtained a wiring permit -		
3. Erected a creosoted or treated pole as specified by local power service representative -		
4. Anchored service pole opposite pull of service drop with approved equipment -		
5. Opened a trench to a depth to accommodate the installation method -		
6. Attached meter base to pole at proper height (5' - 6') above finished grade -		
7. Installed conduit nipple from meter base to waterproof disconnecting means -		
8. Attached disconnecting means enclosure to pole -		
9. Installed conduit bushing or conduit inside meter base -		
10. Attached conduit from meter base to top of pole -		
11. Strapped conduit to pole -		
12. Ran conductors from meter base to extend at leat 16" outside of weatherhead -		
13. Installed weatherhead -		
14. Drove ground rod or buried grounding electrode -		
15. Fastened grounding electrode conductor to grounding electrode -		
16. Ran conductor from meter base to rain-tight disconnecting means -		
17. Installed approved raceway from disconnecting means on pole to bottom of ditch for service entrance -		

The learner:	Yes	No
18. Installed conduit bushing on conduit if applicable -		
19. Installed approved raceway from distribution panel in mobile home to bottom of trench -		
20. Installed conduit bushings, if applicable -		
21. Ran entrance conductors from service pole disconnect to distribution panel in mobile home -		
22. Made all wiring connections -		
23. Insured that a grounding conductuctor from grounding germinal of mobile home distribution panel to frame of home was intact -		
24. Had service inspected -		
25. Filled trench with rock free dirt and if rocks existed followed local power company rules for coverage -		

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlet Boxes

Duty No. C

Task No. 1

Task: Install bar-hanger using appropriate tools and equipment to support square or octagon outlet boxes.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Attached bar to joist so that box would be flush with the finished ceiling -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlet Boxes

Duty No. C

Task No. 2

Task: Install flush mount junction box using appropriate tools and equipment to provide for cable or wire splices.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Located junction box so it was accessible -	____	____
3. Attached junction box to structur so it would be flush with the finished surface -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlet Boxes

Duty No. C

Task No. 3

Task: Install gangable boxes using appropriate tools and equipment to allow mounting of switches and/or receptacles.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Determined number of boxes needed -	____	____
3. Fastened boxes together -	____	____
4. Attached boxes to structure as to be flush with finished surface -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlet Boxes	**Duty No.** C
	Task No. 4

Task: Install octagon outlet box using appropriate tools and equipment to allow for cable splices or switch and receptacle mounting.

Achievement Indicators: The learner:	Yes	No
1. Located installation point on structure -	____	____
2. Attached octagon outlet box to structure according to electrical plans -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Switch Boxes and Outlet Boxes	**Duty No.** C **Task No.** 5

Task: Install surface mount junction box using appropriate tools and equipment to provide space for cable splicing.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point on structure -	____	____
2. Attached surface mount junction box to structure -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlet Boxes

Duty No. C

Task No. 6

Task: Install outlet boxes for receptacles and switches in existing wall using appropriate tools and equipment to allow for mounting of switches and/or receptacles.

Achievement Indicators:

The learner:	Yes	No
1. Located installation point -	____	____
2. Drew outline of box on wall near stud, if possible -	____	____
3. Cut holes in existing wall of size to accept box to be installed or removed paneling or wall board -	____	____
4. Attached and leveled box to structure -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlet Boxes

Duty No. C

Task No. 7

Task: Install recessed fixture housing in ceiling using appropriate tools and equipment to mount lighting fixture.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Measured clearances to meet manufacturer's recommendations -	____	____
3. Cut holes of correct size in ceiling at desired location -	____	____
4. Attached fixture housing to the structure per manufacturer's installation instructions -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

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Duty: Installing Switch Boxes and Outlet Boxes

Duty No. C

Task No. 8

Task: Install flush mount switch and outlet box in a dry wall, lath, plaster, or paneled wall using appropriate tools and equipment to provide for mounting of switches and/or receptacles.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Determined the thickness of the finished surface -	____	____
3. Positioned switch box and/or outlet box -	____	____
4. Attached to structure so that the box would be flish with the finished surface -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlets

Duty No. C

Task No. 9

Task: Install flush mount switch and outlet boxes in a masonry wall using appropriate tools and equipment to provide for mounting of switches and/or receptacles.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Attached previously roughed in cable or conduit to box -	____	____
3. Positioned box in the wall -	____	____
4. Anchored box in wall -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Installing Switch Boxes and Outlet Boxes

Duty No. C

Task No. 10

Task: Install underground, watertight, cast iron box using appropriate tools and equipment to provide waterproof space for cable splices.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Prepared installation site by removing soil with available tools or equipment -	____	____
3. Placed watertight cast iron box in the ground -	____	____
4. Connected cables and/or conduit to box using approved conduits -	____	____
5. Sealed box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 1

Task: Rough in armored cable to outlet box using appropriate tools and equipment to provide current to switches and/or receptacles.

Achievement Indicators: The learner:

	Yes	No
1. Removed proper size knockout from outlet box -	____	____
2. Removed six inches of armor from cable end -	____	____
3. Attached armored cable connector to outlet box -	____	____
4. Installed insulating bushing -	____	____
5. Fed wire through cable connector until cable bottomed out in connector -	____	____
6. Tightened connector or armored cable -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 2

Task: Install non-metallic cable in outlet boxes using appropriate tools and equipment to provide current to switches and/or receptacles.

Achievement Indicators: The learner:	Yes	No
1. Removed one knockout from the outlet box for each cable that entered the box -	____	____
2. Extended the cable into the outlet box six-eight inches:		
a. Tightened clamp on cable if the outlet box was metal -	____	____
b. Attached cable to building structure within eight inches if the outlet box was plastic -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 3

Task: Rough in cable or conduit for branch circuits using appropriate tools and equipment to deliver current to outlet or junction boxes.

Achievement Indicators: The learner:

	Yes	No
1. Determined the location for installing the cable or conduit -	____	____
2. Removed knockout or provided opening for boxes -	____	____
3. Installed cable connector or conduit connector -	____	____
4. Pulled cable for circuit or ran conduit for circuit -	____	____
5. Pulled conductors through conduit, if conduit -	____	____
6. Installed insulated bushing, if metallic conduit -	____	____
7. Attached cables or raceway to structure as required -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 4

Task: Rough in a circuit using appropriate tools and equipment for two three-way switches with feed to the switchbox.

Achievement Indicators: The learner:	Yes	No
1. Located previously installed boxes -	____	____
2. Ran a two-wire cable of proper size to the device being controlled from the remaining switch box -	____	____
3. Stripped at least six inches of outer jacket from each cable -	____	____
4. Attached cable in outlet boxes using approved connectors -	____	____
5. Attached cable to building structure at required intervals -	____	____
6. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 5

Task: Rough in a circuit using appropriate tools and equipment for two three-way switches with feed to the controlled device.

Achievement Indicators: The learner:

	Yes	No
1. Located previously installed boxes -	____	____
2. Ran feeder cable of proper size into the device outlet box -	____	____
3. Ran a three-wire cable of proper size from one switch box to the device outlet box -	____	____
4. Ran a three-wire cable of proper size from the other switch box to the device outlet box -	____	____
5. Stripped at least six inches of outer jacekt from each cable -	____	____
6. Attached cable in outlet boxes using approved connectors -	____	____
7. Attached cable to building structure at required intervals -	____	____
8. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 6

Task: Rough in a circuit using appropriate tools and equipment for two three-way and one four-way switch with feed to a three-way switch.

Achievement Indicators: The learner:

	Yes	No
1. Located previously installed boxes -	____	____
2. Ran feed or cable of proper size to one of the three-way switch boxes -	____	____
3. Ran a three-wire cable from the feed switch box to the four-way switch box -	____	____
4. Ran a three-wire cable from the four-way switch box to the reminaing three-way switch box -	____	____
5. Ran a two-wire cable from the three-way switch box in step 4 to the device being controlled -	____	____
6. Stripped at least six inches of outer jacket from each cable -	____	____
7. Attached cable in outlet boxes using approved connectors -	____	____
8. Attached cable to building structure at required intervals -	____	____
9. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 7

Task: Rough in a circuit using appropriate tools and equipment for two three-way and one four-way switch with feed to the controlled device.

Achievement Indicators: The learner:	Yes	No
1. Located previously installed boxes -	____	____
2. Ran feeder cable into the device outlet box -	____	____
3. Ran a two-wire cable of proper size from device outlet box to one of the three-way switches -	____	____
4. Ran a three-wire cable of proper size from one three-way switch box to four-way switch box -	____	____
5. Ran a three-wire cable of proper size from four-way switch box to other three-way switch box -	____	____
6. Stripped at least six inches of outer jacket from each cable -	____	____
7. Attached cable in outlet boxes using approved connectors -	____	____
8. Attached cable to building structure at required intervals -	____	____
9. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 8

Task: Rough in a circuit using appropriate tools and equipment for two three-way and two four-way switches with feed to a three-way switch.

Achievement Indicators: The learner:	Yes	No
1. Located previously installed boxes -	____	____
2. Ran feeder cable into three-way switch box -	____	____
3. Ran three-wire cable of proper size from three-way switch box to four-way switch box -	____	____
4. Ran three-wire cable of proper size from first four-way switch to the second four-way switch box -	____	____
5. Ran three-wire cable of proper size from second four-way switch box to the second three-way switch box -	____	____
6. Ran two-wire cable of proper size from device to the second three-way switch box -	____	____
7. Stripped at least six inches of outer jacket from each cable -	____	____
8. Attached cable in outlet boxes using approved connectors -	____	____
9. Attached cable to building structure at required intervals -	____	____
10. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 9

Task: Rough in cables using appropriate tools and equipment for a single-pole switch with feed to the switch.

Achievement Indicators: The learner:

	Yes	No
1. Located previously installed boxes -	____	____
2. Ran cable from power source to box for switch -	____	____
3. Ran cable from switch box to first light/device outlet box -	____	____
4. Ran a cable from first outlet box to the second and succeeding outlet boxes if more than one light/device was to be controlled by this switch -	____	____
5. Stripped at least six inches of outer jacket from each cable -	____	____
6. Attached cable in outlet boxes using approved connectors -	____	____
7. Attached cable to building structure at required intervals -	____	____
8. Folded connectors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 10

Task: Rough in cables using appropriate tools and equipment for a single-pole switch with feed to the controlled device.

Achievement Indicators: The learner:	Yes	No
1. Located previously installed boxes -	____	____
2. Ran feeder cable from power source to first light/device box -	____	____
3. Ran cable from first light/device box to box at switch location -	____	____
4. Extended cable from first light/device box to second and succeeding outlet boxes if more than one light/device was to be controlled by this switch -	____	____
5. Stripped at least six inches of outer jacket from each cable -	____	____
6. Attached cable in outlet boxes using approved connectors -	____	____
7. Attached cable to building structure are required intervals -	____	____
8. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D
	Task No. 11

Task: Rough in a circuit using appropriate tools and equipment for a single-pole switch with feed to the last device on the line.

Achievement Indicators: The learner:

	Yes	No
1. Located previously installed outlet boxes -	____	____
2. Ran a feed cable from the power source to the last light/fixture device box -	____	____
3. Ran a three-wire cable from one light device box to the other light box -	____	____
4. Repeated step 3 until all light or device boxes were connected together with three-wire detail -	____	____
5. Ran a two-wire cable to the switch box from the last light or device in a series -	____	____
6. Stripped at least six inches of outer jacket from each cable -	____	____
7. Attached cable in outlet boxes using approved connectors -	____	____
8. Attached cable to building structure at required intervals -	____	____
9. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 12

Task: Rough in a circuit using appropriate tools and equipment for a split circuit duplex receptacle.

Achievement Indicators: The learner:	Yes	No
1. Located previously installed wall box -	____	____
2. Ran three-wire cable from the power source to the wall box -	____	____
3. Stripped at least six inches of outer jacket from each cable -	____	____
4. Attached cable in outlet boxes using approved connectors -	____	____
5. Attached cable to building structure at required intervals -	____	____
6. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 13

Task: Rough in two duplex receptacle circuits using appropriate tools and equipment with two three-way switches controlling one-half of each receptacle.

Achievement Indicators: The learner: Yes No

1. Located previously installed boxes - ____ ____
2. Ran a power source into one three-way switch box - ____ ____
3. Ran a three-wire cable of correct size between the three-way switch boxes - ____ ____
4. Ran a two-wire cable from the outside of distribution panel three-way switch box - ____ ____
5. Ran a wire cable between the two receptacle boxes - ____ ____
6. Stripped at least six inches of outer jacket from each cable - ____ ____
7. Attached cable in outlet boxes using approved connectors - ____ ____
8. Attached cable in building structure at required intervals - ____ ____

CAUTION: The tabs must be removed from the duplex receptacle.

. Folded conductors back into box - ____ ____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 14

Task: Rough in 120 or 240 volt circuits to distribution panel using non-metallic sheathed cable (N.M.C.) using appropriate tools and equipment to provide for connection of circuits to protection devices.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Removed proper size knockout from distribution panel -	____	____
3. Attached a non-metallic connector to distribution panel -	____	____
4. Pulled cable from the outside of distribution panel through the cable connector to opposite side of panel -	____	____
5. Tightened clamp on cable and was careful not to damage insulation -	____	____
6. Identified circuits as to load served -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 15

Task: Rough in cable between an existing box and newly installed box using appropriate tools and equipment to provide current to new box.

Achievement Indicators: The learner:	Yes	No
1. Turned power off -	____	____
2. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
3. Determined route for the cable to travel -	____	____
4. Bored holes for cable as needed -	____	____
5. Removed knockout from both boxes -	____	____
6. Ran cable:		
a. Fastened cable to boxes with appropriate connector and installed insulated bushing if armored cable -	____	____
b. Ran cable into boxes and fastened cable to structure if non-metallic cable -	____	____
7. Turned power on -	____	____
8. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 16

Task: Rough in circuit using conduit and 4" square boxes with plaster rings for two three-way switches controlling one device.

Achievement Indicators: The learner:

	Yes	No
1. Installed four inch boxes with plaster rings -	____	____
2. Installed conduit between four inch square boxes -	____	____
3. Installed conduit from one four inch swuare box to the device box -	____	____
4. Attached conduit to all boxes with approved devices -	____	____
5. Installed conduit bushings if needed -	____	____
6. Attached conduit to structure -	____	____
7. Pulled three wires in conduit between four inch boxes -	____	____
8. Pulled two wires in conduit between device box and switch box -	____	____
9. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 17

Task: Rough in a circuit using appropriate tools and equipment to provide current to a door chime system.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Installed a junction box and mounted transformer -	____	____
3. Ran feeder cable to junction box from power source -	____	____
4. Ran the door bell wire from transformer to chime unit -	____	____
5. Ran the wire from each push button location to the chime unit location -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 18

Task: Rough in a circuit using appropriate tools and equipment to provide current for an intercom system.

Achievement Indicators: The learner:

	Yes	No
1. Read manufacturer's installation instructions -	____	____
2. Ran a power cable to master station -	____	____
3. Attached rough-in kits to building structure -	____	____
4. Ran required size cable(s) from master station to each remote station -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 19

Task: Rough in wiring using appropriate tools and equipment to provide current for a line-voltage thermostat.

Achievement Indicators: The learner:

	Yes	No
1. Ran correct size cable from service panel to outlet box -	____	____
2. Attached cable to outlet box at thermostate location -	____	____
3. Pulled cable from thermostat location to location of device being controlled -	____	____
4. Stripped at least six inches of outer jacket from each cable -	____	____
5. Attached cable in outlet boxes using approved connectors -	____	____
6. Attached cable to building structure at required intervals -	____	____
7. Folded conductors back into box -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 20

Task: Rough in wiring using appropriate tools and equipment to provide current for a low-voltage thermostat.

Achievement Indicators: The learner:

	Yes	No
1. Read manufacturer's installation instructions -	____	____
2. Located installation point of thermostat -	____	____
3. Ran low-voltage wire from the equipment to the make up point of thermstat location -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 21

Task: Install conduit underground using appropriate tools and equipment to provide a waterproof wire and/or cable way.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Opened trench for conduit to a depth no less than the minimum requirements of the National Electrical Code or local power system having jurisdiction -	____	____
3. Installed conduit in open trench -	____	____
4. Installed all bushings -	____	____
5. Filled trench -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 22

Task: Rough in direct burial cable using appropriate tools and equipment to provide current to a remote device.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Opened trench for cable to a depth no less than the minimum requirements of the National Electrical Code and local power system having jurisdiction -	____	____
3. Installed conduit with required bushings where cable entered and left trench -	____	____
4. Installed cable through conduit and trench leaving extra cable for future connections -	____	____
5. Filled trench -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 23

Task: Splice two or more conductors using crimp-type connector to provide for continuity of a circuit.

Achievement Indicators: The learner:

	Yes	No
1. Removed approximately 3/4 inch of insulation from each conductor -	____	____
2. Grouped conductors together and inserted wires into connector -	____	____
3. Used correct crimp tool, applied pressure to make connection -	____	____
4. Removed crimp tool and cut off excess wire outside crimp -	____	____
5. Checked each conductor by pulling on it to be sure the joint was mechanically strong -	____	____
6. Taped or otherwise insulated connection to withstand applied voltage -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits	**Duty No.** D **Task No.** 24

Task: Splice two conductors using a pigtail splice to provide for continuity of a circuit.

Achievement Indicators: The learner:	Yes	No
1. Removed apprxoimately one inch of insulation from each conductor -	____	____
2. Crossed the ends -	____	____
3. Held the wires together and twisted for 6 or 8 turns -	____	____
4. Doubled ends back with pliers so that insulation would not be punctured -	____	____
5. Soldered the tip of the splice -	____	____
6. Insulated wire with approved means -	____	____
7. Taped or otherwise insulated connection to withstand applied voltage -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 25

Task: Splice two or more conductors using mechanical connectors to provide for continuity of a circuit.

Achievement Indicators: The learner:

	Yes	No
1. Removed 1/2" to 3/4" insulation from each conductor to be joined -	____	____
2. Selected the appropriate connectors for the connection(s) to be made -	____	____
3. Grouped conductors together and inserted wires into connectors -	____	____
4. Tightened connectors on connection -	____	____
5. Checked each conductor by pulling on it to be sure the joing was mechanically strong -	____	____
6. Taped or otherwise insulated connection to withstand applied voltage -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Roughing in Feeders, Branch Circuit Cables, and Circuits

Duty No. D

Task No. 26

Task: Run feeder cable from main service panel to auxiliary panel using appropriate tools and equipment to feed auxiliary panel.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Removed knockouts from panel boxes -	____	____
3. Installed cable connector to each panel box -	____	____
4. Stripped sufficient outer jackets from cable ends -	____	____
5. Attached cable to each panel using approved connectors -	____	____
6. Attached cable to building structure at required intervals -	____	____
7. Folded conductors into panel boxes -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E **Task No.** 1

Task: Connect/install duplex receptacle outlets using appropriate tools and equipment to provide a useable outlet.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -		
2. Turned power off -		
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -		
4. Cut conductor at wall box to leave six inches of free conductor -		
5. Removed approximately 3/4 inch of insulation from each conductor -		
6. Connected white conductors to silver or white terminals -		
7. Connected black conductor to brass or gold colored terminals -		
8. Securely connected together two or more grounding conductors using an approved means and fastened to receptacle and to bix if required -		
9. Connected grounding conductors to green terminals and to wall box, if the box was metal -		
10. Fastened outlet to wall box -		
11. Installed cover plate -		
12. Turned power on -		
13. Tested for correct polarity -		

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty:	Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.**	E
		Task No.	2

Task: Connect single pole switch using appropriate tools and equipment to provide current to one or more electrical devices.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point at connection(s) with voltage tester -	____	____
4. Removed apprxoimately 3/4 inch insulation from the ends of each conductor -	____	____
5. Made wiring connection to switch using terminals or connectors provided and was sure all connections were tight -	____	____
6. Attached switch to box with means provided -	____	____
7. Installed cover plate -	____	____
8. Turned power on -	____	____
9. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E
	Task No. 3

Task: Connect/install single pole switch with pilot light using appropriate tools and equipment to provide current to one or more electrical devices.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection9s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Cut conductor at wall box to leave six inches of free conductor -	____	____
6. Removed approximately 3/4 insulation from each of the conductors -	____	____
7. Connected white or neutral conductor to white or silver terminal on pilot light -	____	____
8. Connected underground conductors to identified line of lead conductors of switch -	____	____
9. Attached switch with pilot light to wall box -	____	____
10. Installed cover plate -	____	____
11. Turned power on -	____	____
12. Turned switch on -	____	____
13. Assured required operation -	____	____
14. Rechecked connections if device did not work or pilot light did not burn	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 4

Task: Connect/install three-way switches using appropriate tools and equipment to provide current to one or more electrical devices.

Achievement Indicators: The learner: Yes No

1. Located installation point - _____ _____
2. Turned power off - _____ _____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester - _____ _____
4. Read manufacturer's installation instructions - _____ _____
5. Cut conductor at wall box to leave six inches of free conductor - _____ _____
6. Removed approximately 3/4 inch of insultation from each conductor - _____ _____
7. Identified conductors - _____ _____
8. Connected source or hot lead to identified switch terminal at one switch location - _____ _____
9. Connected travelers to either of other two terminals on switch - _____ _____
10. Connected switched leg to identified switch terminals at second switch location - _____ _____
11. Connected traveler to either of other two terminals at second switch location - _____ _____
12. Attached switches to wall boxes - _____ _____
13. Installed cover plates - _____ _____
14. Turned power on - _____ _____
15. Assured required operation of switch at both locations - _____ _____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E	**Task No.** 5

Task: Connect/install four-way switches using appropriate tools and equipment to provide current to one or more electrical devices.

Achievement Indicators: The learner:

	The learner:	Yes	No
1.	Located installation point -		
2.	Turned power off -		
3.	Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -		
4.	Read manufacturer's installation instructions -		
5.	Cut conductor at wall box to leave six inches of free conductor -		
6.	Removed outer sheath leaving approximately 1/2 inch protruding to remains in box -		
7.	Removed approximately 3/4's inch of insulation from each conductor -		
8.	Identified conductors (at least four) -		
9.	Connected conductors to appropriate terminal on switch as per diagram supplied by switch manufacturer -		
10.	Attached switch to wall box -		
11.	Installed cover plate -		
12.	Turned power on -		
13.	Operated switch at each location to determine if cincuit could be turned on and off -		

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 6

Task: Connect split circuit duplex receptacle using appropriate tools and equipment to provide two-circuit control.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Cut conductor at wall box to leave six inches of free conductor -	____	____
6. Removed approximately 3/4's inch of insulation from each conductor -	____	____
7. Removed break-off tab from line side of receptacle to cause it to be a split-wire receptacle -	____	____
8. Connected white or neutral conductor to silver or white terminal -	____	____
9. Connected one of the other supply conductors to one of the brass or gold terminals -	____	____
10. Connected the remaining supply conductor to the remaining brass or gold terminal -	____	____
11. Connected bare or green grounding conductor to green terminal and to wall box if it was a metal box -	____	____
12. Attached duplex receptacle to wall box -	____	____
13. Installed cover plate -	____	____
14. Turned power on -	____	____
15. Checked that the receptacle had been supplied from two sources by turning off one source -	____	____
16. Tested for correct polarity -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty:	Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E **Task No.** 7

Task: Connect/install three-wire 220 volt receptacle using appropriate tools and equipment to provide current for plug-in devices.

Achievement Indicators: The learner:

	The learner:	Yes	No
1.	Located installation point -	____	____
2.	Turned power off -	____	____
3.	Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4.	Read manufacturer's installation instructions -	____	____
5.	Determined that power has been turned off by checking each conductor with voltage tester -	____	____
6.	Cut conductor at wall box to leave six inches of free conductor -	____	____
7.	Removed approximately 3/4 inch insulation from each conductor -	____	____
8.	Connected grounding conductor (green or bare) to grounding terminal -	____	____
9.	Connected one-line conductor to one of brass or gold colored terminal -	____	____
10.	Connected remaining line conductor to other brass or gold colored terminal -	____	____
11.	Attached receptacle to wall box -	____	____
12.	Installed cover plate -	____	____
13.	Turned power on -	____	____
14.	Checked for correct polarity and voltage -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 8

Task: Connect/install four-wire 220 volt receptacles using appropriate tools and equipment to provide current for plug-in devices.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -		
2. Turned power off -		
3. Determined that power off by checking conductor(s) at the point of connection(s) with voltage tester -		
4. Read manufacturer's installation instructions -		
5. Cut conductors at wall box to leave six inches of free conductor -		
6. Removed approximately 3/4's inch insulation from each conductor -		
7. Connected grounding conductor (green or bare) to grounding terminal -		
8. Connected one-line conductor to one of brass or gold colored terminal -		
9. Connected remaining line conductor -		
10. Connected white conductor to identified neutral terminal -		
11. Attached receptacle to wall box -		
12. Installed cover plate -		
13. Turned power on -		
14. Checked for required polarity -		
15. Checked for required voltage -		

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 9

Task: Install/connect ground fault interrupting device using appropriate tools and equipment to provide protected circuit in outdoor, kitchen, or bathroom locations.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking the conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Snapped or bolted breaker in a breaker panel if a circuit breaker-type device -	____	____
6. Located circuit conductors to be protected for ground fault interrupting device -	____	____
7. Removed approximately 3/4 inch insulation from each conductor -	____	____
8. Connected grounding conductor to ground bar in breaker panel -	____	____
9. Connected white or neutral conductor or identified terminal of circuit breaker -	____	____
10. Connected free end of coiled white nuetral conductor of lead attached to circuit breaker to neutral bar in breaker panel -	____	____
11. Connected black or circuit conductor to load terminal of circuit breaker -	____	____
12. Determined which outlet box ground fault interrupting receptacle type device was to be mounted in if ground fault interrupting was of ground fault interrupting receptacle type:		
a. Folded wire end out of wall box -	____	____
b. Removed approximately 3/4 inch insulation from each conductor -	____	____
c. Connected green or bare conductor to grounding terminal on ground facult interrupting device and to wall box if it was of metal -	____	____

The learner:	Yes	No
12. Continued		
d. Connected white wire to silver colored terminal of receptacle -	___	___
e. Connected black wire to brass or gold colored terminal -	___	___
f. Attached ground fault interrupting device to wall box -	___	___
g. Attached cover plate -	___	___
13. Turned power on -	___	___
14. Tested units for correct operation as per manufacturer's instructions -	___	___

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

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Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 10

Task: Connect recessed fixture box in ceiling using appropriate tools and equipment to be flush and anchored to provide adequate lighting level.

Achievement Indicators: The learner:

	Yes	No
1. Located previously installed box -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Removed approximately 3/4 end of each conductor -	____	____
5. Made wiring connections in junction box, using correct connectors and methods and observing correct polarities -	____	____
6. Insulated all connections -	____	____
7. Folded wiring back into junction box -	____	____
8. Installed cover on junction box -	____	____
9. Installed lamp no greater than manufacturer's recommendation -	____	____
10. Installed fixture trim -	____	____
11. Turned power on -	____	____
12. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E
	Task No. 11

Task: Connect wires from junction box to appliance using appropriate tools and equipment to supply current to direct-wired device.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -		
2. Turned power off -		
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -		
4. Read manufacturer's installation instructions -		
5. Cut conductors at wall box to leave six inches of free conductor -		
6. Ran power cord from appliance to junction box through approved cord connector -		
7. Removed approximately 3/4 inch of insulation from each conductor -		
8. Made connections in junction box using correct connector and methods and observing correct polarity -		
9. Installed cover on junction box -		
10. Turned power on for appliance circuit -		
11. Turned appliance control switch on -		
12. Assured required operation -		
13. Turned appliance off -		

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 12

Task: Connect/install emergency warning system using appropriate tools and equipment to provide for fire and/or security protection.

Achievement Indicators: The learner:

		Yes	No
1.	From layout of system, determined location of master control unit and points to be monitored -	____	____
2.	Turned power off -	____	____
3.	Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4.	Read manufacturer's installation instructions -	____	____
5.	Ran low voltage wiring from each point to be monitored back to central location of master unit -	____	____
6.	Installed window foil, window switch, door switch, mat switchs, smoke detector, fire detector, etc, in each room to be monitored -	____	____
7.	Ran 110 volt wiring circuit from main service panel to alarm system and control station -	____	____
8.	Checked rough in wiring for shorts and open circuits -	____	____
9.	Connected detectors -	____	____
10.	Connected master control unit -	____	____
11.	Turned power on -	____	____
12.	Assured required operation of system by activating.	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Triming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 13

Task: Install/connect hot water heater using appropriate tools and equipment to provide proper voltage and amperage to heater.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Installed cable connector or conduit connector in box on water heater -	____	____
5. Connected cable or conduit to water heater -	____	____
6. Removed approximately 3/4 inch of insulation from each conductor -	____	____
7. Connected wiring using method and materials suitable for conditions encountered -	____	____
8. Read water heater nameplate -	____	____
9. Determined that correct voltage is available at water heater -	____	____
10. Checked to see that tank was full of water -	____	____
11. Turned power on -	____	____
12. Checked power consumption using clamp on ampmeter -	____	____
13. Installed cover plate -	____	____

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Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 14

Task: Connect/install humidity control device using appropriate tools and equipment to electrically regulate home/commercial moisture level.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Connected wiring to humidity control device with connector suitable for conditions encountered. Was sure connections were tight -	____	____
6. Attached humidity control device to wall or to return air duct system depending on type of device being used -	____	____
7. Turned power on -	____	____
8. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty:	Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E **Task No.** 15

Task: Connect intercom system using appropriate tools and equipment to provide for intra-structure communications.

Achievement Indicators: The learner:	Yes	No
1. Located installation points -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking line conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Connected wiring to each intercom unit in system as per manufacturer's instructions and wiring diagram using connectors suitable for conditions encountered -	____	____
6. Turned power one when all units fo system had been connected -	____	____
7. Checked system for correct operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 16

Task: Connect low-voltage lighting control using appropriate tools and equipment to provide for adequate lighting levels.

Achievement Indicators: The learner: Yes No

1. Located installation point - ____ ____
2. Turned power off - ____ ____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester - ____ ____
4. Read manufacturer's installation instructions - ____ ____
5. Connected power leads of low-voltage control devices to light fixture wiring using suitable connectors - ____ ____
6. Connected low-voltage control lead to relays and control switches as required to complete the wiring of the low-voltage lighting control using suitable connector - ____ ____
7. Turned power on - ____ ____
8. Checked for operation of control system - ____ ____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E
	Task No. 17

Task: Connect moisture resistant receptacle using appropriate tools and equipment to provide safe connection means in wet locations.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductors at point of connections with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Removed insulation from each conductor to length suggested by manufacturer -	____	____
6. Connected white wire to silver colored terminal -	____	____
7. Connected black wire to gold or brown colored terminal -	____	____
8. Connected grounding conductor to green colored terminal -	____	____
9. Attached receptacle to receptacle housing and was sure gaskets or other water proofing materials were in place -	____	____
10. Installed protective covers or cover plates -	____	____
11. Turned power on -	____	____
12. Checked for correct polarity -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 18

Task: Install/connect photo-electric cell control using appropriate tools and equipment to provide light-sensitive device control.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Attached photo-electric cell to outlet box or light fixture as appropriate -	____	____
6. Made wiring connections per manufacturer's instruction using suitable connectors -	____	____
7. Installed cover plates or rehung fixture -	____	____
8. Turned power on -	____	____
9. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 19

Task: Connect/install delayed action or time switch using appropriate tools and equipment to provide automatic device control.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Cut conductor at wall box to leave six inches of free conductors -	____	____
6. Removed approximately 3/4 inch of insulation from each conductor -	____	____
7. Connected conductors to switch terminals -	____	____
8. Attached switch to wall box -	____	____
9. Installed cover plate -	____	____
10. Turned power on -	____	____
11. Turned switch on -	____	____
12. Assured required operation of switch -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:

Resources:

Duty:	Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.**	E
		Task No.	20

Task: Connect water pump motor using appropriate tools and equipment to provide adequate water supply.

Achievement Indicators:

The learner:	Yes	No
1. Located installation point -		
2. Turned power off -		
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -		
4. Read manufacturer's installation instructions -		
5. Connected motor leads to wiring previously roughed in from the pump controller using suitable connectors and methods for conditions encountered -		
6. Replaced covers on junction boxes or controller -		
7. Turned power on for water pump circuit -		
8. Turned pump controller on -		
9. Checked that pump motor ran when power had been applied to motor -		

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E **Task No.** 21

Task: Install surface raceway using appropriate tools and equipment to provide circuit path for electrical devices.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Attached junction box to cable or conduit that was going to supply surface raceway -	____	____
6. Attached junction box to building structure -	____	____
7. Attached lengths of surface raceway to building structure enough to complete desired circuit using clips, clamps, coupling, etc. designed for sighting being installed -	____	____
8. Installed circuit conductor in raceway -	____	____
9. Made wiring connections using terminals or connectors suitable for conditions encountered -	____	____
10. Installed all cover plates -	____	____
11. Turned power on -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty:	Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E **Task No.** 22
Task:	Install/connect automatic garage door operator using appropriate tools and equipment to allow vehicle operated operation.	

Achievement Indicators: The learner:

		Yes	No
1.	Located power supply and location point of receptacle to be installed -	____	____
2.	Turned power off -	____	____
3.	Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4.	Attached outlet box to structure so that it would be flush with finished surface -	____	____
5.	Read manufacturer's installation instructions -	____	____
6.	Ran wire of correct size from outlet box to power source, using approved method -	____	____
7.	Connected receptacle and installed trim -	____	____
8.	Ran control wire of correct size from garage door operator to installation point of control switch and connect switch -	____	____
9.	Connected control wire to door operator per manufacturer's installation instructions -	____	____
10.	Inserted cord end into receptacle if it was a plug in-model -	____	____
11.	Turned power on -	____	____
12.	Removed all objects from under door and closed door by pressing manual switch -	____	____
13.	Tested operation of door using local control station -	____	____
14.	Tested operation of door using radio control unit -	____	____
15.	Left all keys, transmitters, instructions, etc. with owner -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances	**Duty No.** E
	Task No. 23

Task: Connect de-icing equipment using appropriate tools and equipment to provide ice-free surfaces.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Made wiring connection in weathertight enclosures -	____	____
6. Made wiring connections to temperature control devices -	____	____
7. Turned power on -	____	____
8. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 24

Task: Connect door chime system using appropriate tools and equipment to allow for at least two-point operation.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Attached chime unit to structure -	____	____
6. Made low-voltage wiring connections -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 25

Task: Connect/install electric fence charger using appropriate tools and equipment to restrain livestock or predators.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Installed suitable ground to charger -	____	____
6. Connected charger unit to power source using methods and connections suitable for the purpose -	____	____
7. Connected wiring from fence charger to fence -	____	____
8. Turned power back on circuit -	____	____
9. Turned fence charger unit on -	____	____
10. Checked for high voltage output -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:

Resources:

Duty: Trimming Out (Finishing) Electrical Devices and Appliances

Duty No. E

Task No. 26

Task: Connect 120/240 circuits to circuit breaker panel using non-metallic cable to provide circuit over-current protection.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at points of connection(s) with voltage tester -	____	____
4. Determined that cables have entered box through approved connector -	____	____
5. Removed outer jacket from each cable back to point just inside box where cable enters box -	____	____
6. Identified each cable as to circuit it was to serve -	____	____
7. Identified conductors in each cable -	____	____
8. Connected all bare or green grounding conductors to grounding terminal bar -	____	____
9. Connected white conductors to neutral bar for 120 volt circuits -	____	____
10. Connected all 120 volt circuits to single pole breaker of the correct ampacity -	____	____
11. Connected all 240 volt circuits double pole breaker of the correct ampacity -	____	____
12. Used multimeter, checked each circuit for shorts and grounds -	____	____
13. Attached cover to panel if all circuits had been connected -	____	____
14. Turned power on -	____	____
15. Checked each circuit -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures

Duty No. F

Task No. 1

Task: Connect/install post lights using appropriate tools and equipment to provide for exterior lighting.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Was sure post was well anchored -	____	____
3. Turned power off -	____	____
4. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
5. Read manufacturer's installation instructions -	____	____
6. Connected post light wire ends to power source observing polarity -	____	____
7. Connected ground wire -	____	____
8. Attached fixture to post -	____	____
9. Installed lamps -	____	____
10. Turned power on -	____	____
11. Assured required operation of light -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Installing Lighting Fixtures	**Duty No.** F **Task No.** 2

Task: Install/connect fan controlled by switch using appropriate tools and equipment to allow fan to be switched on and off remotely.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -		
2. Turned power off -		
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -		
4. Read manufacturer's installation instructions -		
5. Removed approximately 3/4's inch insulation from each conductor -		
6. Made wiring connections -		
7. Fastened ground wire -		
8. Attached fan to mounting brackets -		
9. Turned power on -		
10. Checked fan for correct operation -		
11. Assured required current drain -		

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures	**Duty No.** F **Task No.** 3

Task: Connect/install flood lights using appropriate tools and equipment to provide for utilitarian lighting of the exterior.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Unfolded conductors from box -	____	____
5. Removed approximately 3/4's inch insulation from each conductor -	____	____
6. Read manufacturer's installation instructions for flood lights -	____	____
7. Connected white wires from flood lights to white wires extending from wiring device with approved connectors -	____	____
8. Attached black wires of fixture to the switch leg -	____	____
9. Connected ground wire to ground terminal -	____	____
10. Attached flood light to box using supplied screws -	____	____
11. Installed lamps -	____	____
12. Turned power on -	____	____
13. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures	**Duty No.** F **Task No.** 4

Task: Connect/install lighting dimmer system using appropriate tools and equipment to obtain various lighting levels from one fixture.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Examined the dimmer to be sure it was the proper type and size for the application -	____	____
6. Examined the mounting boxes and circuit conductors to be sure they were correct -	____	____
7. Made the wiring connections: circuit and grounding -	____	____
8. Installed the switches and dimmers with the mounting hardware -	____	____
9. Turned power on -	____	____
10. Assured required operation -	____	____

Criteria: Competence in the program will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures	**Duty No.** F **Task No.** 5

Task: Install/connect heat-a-vent light using appropriate tools and equipment to provide for extra heating and ventilation in bathrooms.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Installed the housing per instructions -	____	____
6. Attached previously run wire from the power source to the housing using a cable clamp and the appropriate knockout -	____	____
7. Removed approximately 3/4's inch of insulation from each conductor -	____	____
8. Identified all conductors -	____	____
9. Made all wiring connections observing polarity -	____	____
10. Connected the ground wire -	____	____
11. Installed cover plates on junction boxes to cover exposed wiring -	____	____
12. Installed trim -	____	____
13. Turned power on -	____	____
14. Assured required operation -	____	____

Duty: Installing Lighting Fixtures	**Duty No.** F **Task No.** 6

Task: Connect/install light fixture using appropriate tools and equipment to provide light.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Connected fixture wire to power supply observing polarity -	____	____
6. Connected ground wire -	____	____
7. Attached fixture base to box with screws supplied -	____	____
8. Installed lamps -	____	____
9. Turned power on -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures	**Duty No.** F **Task No.** 7

Task: Install/connect photo-electric control on a light using appropriate tools and equipment to provide unique control of light other than normal switch.

Achievement Indicators: The learner:

	Yes	No
1. Located light to receive photo-electric control -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Took light down -	____	____
6. Checked light for a knockout that will accept the photo cell. If none existed, used drill or other means to make the desired hole -	____	____
7. Attached photo-electric control to light base -	____	____
8. Connected wire ends per manufacturer's installation instructions -	____	____
9. Hung light -	____	____
10. Turned power on -	____	____
11. Tested according to manufacturer's installation instructions -	____	____
12. If the instructions were not supplied -		
a. Placed a dark covering over cell lens. Light should come on in approximately three minutes -	____	____
b. Removed dark covering. Light should stop burning in approximately three minutes -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures	**Duty No.** F **Task No.** 8

Task: Install/connect power failure lighting using appropriate tools and equipment to provide for emergency lighting.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Attached the power failure light to the structure per manufacturer's instructions -	____	____
6. Fastened branch circuit, cable, or conduit to the light -	____	____
7. Removed approximately 3/4's inch insulation from each conductor -	____	____
8. Made all electrical connections observing polarity -	____	____
9. Installed all cover plates on junction boxes to cover exposed wiring -	____	____
10. Turned power on -	____	____
11. Turned power off or pushed test switch, after power had been on for a time sufficient to charge the batteries -	____	____
12. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures	**Duty No.** F
	Task No. 9

Task: Install/connect moisture resistant fixtures using appropriate tools and equipment to comply with industrial standards.

Achievement Indicators:

The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Installed box or fixture housing per manufacturer's installation instructions -	____	____
6. Made wiring connections observing polarity -	____	____
7. Attached lamp assembly to housing or outlet box. Made certain that all gaskets and seals were in place -	____	____
8. Turned power on -	____	____
9. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Lighting Fixtures	**Duty No.** F
	Task No. 10

Task: Install/connect pilot light using appropriate tools and equipment to show when appliance is on.

Achievement Indicators: The learner:	Yes	No
1. Located appliance or equipment to receive the pilot light -	____	____
2. Located installation point of pilot light -	____	____
3. Turned power off -	____	____
4. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
5. Read manufacturer's installation instructions -	____	____
6. Attached pilot light to appliance or equipment -	____	____
7. Ran wire of correct size from load side of equipment terminals to the pilot light -	____	____
8. Connected wire ends of pilot light to wires; ran from load terminals -	____	____
9. Turned power on -		
10. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outline by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Electrical Environmental Control Components

Duty No. G

Task No. 1

Task: Connect/install baseboard heat unit using appropriate tools and equipment to provide heat.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read the manufacturer's installation instruction -	____	____
5. Removed heat unit from housing, if required -	____	____
6. Attached wiring to housing -	____	____
7. Placed temporary spacer approximately one inch thick under each end of heater to allow for later installation of floor covering -	____	____
8. Attached housing to wall. Used a level to verify that unit is level -	____	____
9. Removed spacer -	____	____
10. Replaced heat unit in housing, if unit has been removed -	____	____
11. Identified conductors, made connections including equipment ground -	____	____
12. Checked circuit to see if it is free of grounds using an ohmmeter -	____	____
13. Installed junction box cover and all trim hardware -	____	____
14. Turned power on -	____	____
15. Assured required current draw using an ammeter -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Installing Electrical Environmental Control Components	**Duty No.** G
	Task No. 2

Task: Connect ceiling heat cable to thermostat using appropriate tools and equipment to allow heat cable output to be controlled.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -		
2. Turned power off -		
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -		
4. Read manufacturer's installation instructions -		
5. Pulled ends of heat cable out of wall box for thermostat -		
6. Determined wattage (size) of heat cable by looking at label near end of cable -		
7. Connected cable leads and power leads to thermostat -		
8. Turned circuit on and used clamp on type ammeter, to verify that circuit is drawing correct amount of power -		
9. Completed installation of thermostat on to wall box -		

Criteria: Competence in the task will be recognized when the work meets the requirement outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Electrical Environmental Control Components	**Duty No.** G
	Task No. 3

Task: Connect central electric heat using appropriate tools and equipment to provide heat.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions and unit data plate -	____	____
5. Identified conductors -	____	____
6. Connected cable for supply conductors to disconnect switch -	____	____
7. Connected supply conductors to line side of disconnect switch -	____	____
8. Ran conduit from disconnect switch to heat unit -	____	____
9. Pulled conductor to terminals provided inside of heat unit -	____	____
10. Connected conductor to terminals provided inside of heat unit -	____	____
11. Connected equipment grounding conductor -	____	____
12. Connected wiring from thermostat control cable to terminals provided in electric heat unit -	____	____
13. Installed cover plates on junction boxes to cover exposed wiring -	____	____
14. Checked connections for shorts and grounds with ohmmeter -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Electrical Environmetnal Control Components

Duty No. G

Task No. 4

Task: Connect furnace motor using appropriate tools and equipment to comply with industry standards.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Identified conductors and determined connections for voltage supplied -	____	____
6. Attached power cable or conduit to motor controller -	____	____
7. Connected supply conductor to terminals provided on motor controller -	____	____
8. Ran conduit, cable, or wire from motor controller to furnace motor -	____	____
9. Connected conductors at motor and at motor controller using approved connectors -	____	____
10. Installed cover plates on junction boxes to cover exposed wiring -	____	____
11. Turned power on -	____	____
12. Turned motor controller on -	____	____
13. Checked motor rotation -	____	____
14. Checked motor amps with ammeter. Amperage is within limits set on motor data plate -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Electrical Environmental Control Components	**Duty No.** G
	Task No. 5

Task: Connect/install gas or oil fired heating unit using appropriate tools and equipment to provide heat.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Identified conductors -	____	____
6. Attached supply conductor cable or conduit to local unit disconnect switch -	____	____
7. Connected supply conductors to terminals provided in local disconnect switch -	____	____
8. Ran appropriate conduit, wire, cable, etc., from local disconnect switch to gas heat unit -	____	____
9. Made wiring connections at local unit disconnect switch and at heat unit using ohmmeter. Checked wiring to see if it was clear of grounds and shorts -	____	____
10. Made wiring connections required for thermostat control of unit -	____	____
11. Turned fuel valve off on heating unit -	____	____
12. Turned power on for heating unit -	____	____
13. Followed unit directions for lighting pilot light -	____	____
14. Turned fuel valve on for heat unit, after amount of time specified by manufacturer -	____	____
15. Sat thermostat to bring heat on -	____	____
16. Ran unit for a few minutes -	____	____
17. Sat thermostat to below normal setting -	____	____

	Yes	No
18. Made sure unit cut off -	____	____
19. Installed cover plates on junction boxes to cover exposed wiring -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Electrical Environmental Control Components

Duty No. G

Task No. 6

Task: Connect line voltage thermostat using appropriate tools and equipment to provide for regulation of heat.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read manufacturer's installation instructions -	____	____
5. Attached supply cable or conduit to box for thermostat -	____	____
6. Identified conductors -	____	____
7. Connected supply conductors to line terminals of thermostat -	____	____
8. Connected load conductors to load side of thermostat -	____	____
9. Attached thermostat to box provided for it -	____	____
10. Turned power on -	____	____
11. Sat thermostat to the desired temperature -	____	____
12. Observed operation through at least one cycle -	____	____
13. Turned power off or left thermostat set for normal operation of equipment as per instruction of owner -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Electrical Environmental Control Components

Duty No. G

Task No. 7

Task: Connect low voltage thermostat using appropriate tools and equipment to regulate heat output.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Removed thermostat from shipping carton -	____	____
5. Read manufacturer's installation instructions -	____	____
6. Removed approximately 3/4's inch insulation from each conductor -	____	____
7. Connected conductors to thermostat using methods and connectors suitable for conditions encountered, also observing color coding of wiring -	____	____
8. Attached thermostat to structure or designated point on equipment -	____	____
9. Determined that thermostat had been installed level and plumb -	____	____
10. Sat heat anticipator adjustment to match current rating of device being controlled -	____	____
11. Installed all trim and cover plates -	____	____
12. Turned power on -	____	____
13. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Installing Electrical Environmental Control Components	**Duty No.** G
	Task No. 8

Task: Connect/install wall heater using appropriate tools and equipment to provide for heat.

Achievement Indicators: The learner:

		Yes	No
1.	Located installation point -		
2.	Turned power off -		
3.	Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -		
4.	Read manufacturer's installation instructions -		
5.	Removed heating coils from housing -		
6.	Attached cable to housing -		
7.	Attached housing to structure -		
8.	Identified conductors -		
9.	Removed only sufficient insulation to accept connector -		
10.	Connected heater leads to power source -		
11.	Connected ground to grounding terminal -		
12.	Installed heater in housing -		
13.	Installed trim -		
14.	Turned power on -		
15.	Observed heat coils to see if they turned red or tested heater performance with ammeter -		

Criteria: Competence in the task will be recognized when the work meet the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Installing Electrical Environmental Control Components	**Duty No.** G
	Task No. 9

Task: Install ceiling heat cable using appropriate tools and equipment to provide heat.

Achievement Indicators: The learner:	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Read and was familiar with the requirements of Article 424 of the National Electrical Code -	____	____
5. Read manufacturer's installation instructions -	____	____
6. Determined from manufacturer's instructions or electrical floor plan that the cable supplied was the correct size -	____	____
7. Determined the space between cable runs -	____	____
8. Attached cable only to gypsum board, plaster lath, or other similar fire resistant nonconductive -	____	____
9. Ran feeder cable from thermostat location through wall and/or floor partition back to distribution -	____	____
10. Notified authority having jurisdiction that installation ready for inspection -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Maintaining Existing Wiring	**Duty No.** H
	Task No. 1

Task: Diagnose/repair flourescent fixture using appropriate tools and equipment to provide light.

Achievement Indicators: The learner:	Yes	No
1. Checked voltage with meter -	____	____
2. Checked bulbs visually for darkened ends, burning red at ends, or flashing on and off, with proper voltage at fixture and power on. Replaced bulb if any of these exists -	____	____
3. Determined if fixture is self-starting or used separated starters, if bulbs were not defective. Replaced with new ones of correct size, if it has starters -	____	____
4. Turned power off, if the bulbs and starters were defective -	____	____
5. Removed cover from fixture and checked wiring -	____	____
6. Replaced ballast, if wiring was not loose and bulbs and starters were not defective -	____	____
7. Re-installed cover and other parts removed for wiring inspection -	____	____
8. Turned power on -	____	____
9. Assured flourescent light operation -	____	____

Criteria: Competence in the task will be recognized when the light burns when repairs are complete.

Tools and Equipment:	**Resources:**

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 2

Task: Diagnose and repair/replace lights using appropriate tools and equipment to provide light.

Achievement Indicators: The learner:

	Yes	No
1. Removed and tested bulb with ohmmeter or other means -	____	____
2. Used volt meter to check for correct voltage at light fixture connections, if bulb was good -	____	____
3. Repaired or replaced fixture, if voltage was correct in fixture connections:	____	____
a. Turned power off -	____	____
b. Removed fixture -	____	____
c. Repaired or replaced fixture -	____	____
d. Re-installed fixture -	____	____
4. Checked/corrected for problems at power supply, if voltage was incorrect:		
a. Measure continuity of fuse(s)/breaker(s) -	____	____
b. Removed/replaced faulty fuse(s)/breaker(s) -	____	____

Criteria: Competence in the task will be recognized when the light burns after repairs are complete.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring	**Duty No.** H
	Task No. 3

Task: Repair/replace relays and timers using appropriate tools and equipment to make functional.

Achievement Indicators: The learner:

	Yes	No
1. Turned power off -	____	____
2. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -	____	____
3. Replaced relay or timer with equivalent part -	____	____
4. Turned power on -	____	____
5. Assured relay/timer operation -	____	____

Criteria: Competence in the task will be recognized when the relay and timer operate when power is restored.

Tools and Equipment:	**Resources:**

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 4

Task: Repair water heater using appropriate tools and equipment to make functional.

Achievement Indicators: The learner:

	Yes	No
1. Turned power off -		
2. Removed access panel from water heater -		
3. Inspected wiring and terminal connections -		
4. Turned power on, if wiring was secure and routed as required -		
5. Used voltage tester, checked for correct voltage at line terminals on high limit control -		
6. Checked power supply, without correct voltage at this point -		
7. Checked voltage at load terminals on high limit control -		
8. Pressed reset button on high limit control, if there was no voltage at load terminals -		
9. Replaced high limit control, if power was not restored -		
10. Checked voltage at load terminals on thermostat -		
11. Replaced thermostat, if correct voltage is not presented -		
12. Turned power off -		
13. Checked heating element(s), used ohmmeter, for open short and ground -		
14. Turned off water supply, drained tank and replaced element, if element(s) were to be replaced -		
15. Determined if pressure relief valve is in place -		
16. Turned water supply on and opened hot water faucet to let air escape while tank is filling, with element in place -		
17. Turned faucet off and checked for leak, when tank was full -		
18. Turned power on -		

	Yes	No
19. Assured required operation with ammeter -	____	____
20. Replaced access panel -	____	____

Criteria: Competence in the task will be recognized when the water heater heats at rated capacity and to temperature of thermostat setting.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 5

Task: Install and maintain emergency lighting using appropriate tools and equipment to provide light in emergency.

Achievement Indicators:

The learner:	Yes	No
1. Made wiring connections according to manufacturer's instructions -	____	____
2. Connected power to unit and assured required operation -	____	____
3. Located lighting so that designated escape routes are clearly visible -	____	____
4. Tested periodically -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 6

Task: Repair or replace frayed service cords using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:	Yes	No
1. Turned power off -	____	____
2. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
3. Made surecord was of sufficient size for load being served, if replacement of service cord was made -	____	____
4. Removed old cord from appliance and points of attachment -	____	____
5. Attached new cord to appliance and secured ends of cord in boxes, leaving sufficient free ends for connections, maintained strain relief if necessary -	____	____
6. Removed sufficient insulation from conductor ends for connections -	____	____
7. Connected ends of cable to existing wires or terminals making sure polarity is correct -	____	____
8. Turned power on -	____	____
9. Checked circuit being served for required voltage and polarity -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring	**Duty No.** H
	Task No. 7

Task: Replace existing interior load center using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:

	Yes	No
1. Turned power off -		
2. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -		
3. Removed wires from old box and marked circuits -		
4. Removed old box -		
5. Attached new load center to structure -		
6. Connected existing wires to new load center -		
7. Inserted breakers of proper size and type -		
8. Connected existing wires to breakers -		
9. Turned power on -		
10. Tested all circuits -		
11. Filled out circuit directory -		
12. Replaced cover -		

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code, and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 8

Task: Replace cable using appropriate tools to restore function.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Removed old cable being replaced -	____	____
5. Terminated cable inside an enclosure through approved connectors -	____	____
6. Connected cable to terminals or spliced to other conductors with approved splices -	____	____
7. Taped or otherwise insulated connections to withstand applied voltage where required -	____	____
8. Turned power on -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 9

Task: Replace circuit breakers using appropriate tools and equipment to restore service.

Achievement Indicators: The learner:	Yes	No
1. Turned power off -	____	____
2. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
3. Removed one breaker from panel -	____	____
4. Removed conductor from old breaker -	____	____
5. Connected new breaker to conductor -	____	____
6. Installed breaker to panel -	____	____
7. Replaced each breaker in the same manner -	____	____
8. Turned power on -	____	____
9. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 10

Task: Replace existing receptacle or switch using appropriate tools and equipment to restore to function.

Achievement Indicators: The learner:	Yes	No
1. Turned power off -	____	____
2. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
3. Removed switch or receptacle from box -	____	____
4. Disconnected conductor from existing receptacle and switch -	____	____
5. Connected switch or receptacle observing correct polarities -	____	____
6. Connected ground wire to grounding terminal on receptacle -	____	____
7. Pushed switch or receptacle into outlet box and tightened screws -	____	____
8. Replaced outlet covers -	____	____
9. Turned power on -	____	____
10. Checked for proper polarity -	____	____
11. Turned switch on -	____	____
12. Assured receptacle/switch -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 11

Task: Replace fuses using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:

	Yes	No
1. Turned power off serving fuse panel -	____	____
2. Removed cover from fuse panel so wire size can be observed if there is a question as to fuse size -	____	____
3. Checked wiring connections -	____	____
4. Inserted all fuses of correct size and type. Was sure all fuses were tight in holders -	____	____
5. Turned power on -	____	____
6. Checked voltage with tester at each fuse holder -	____	____
7. Replaced fuse panel cover -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 12

Task: Replace grounding electrode conductor using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:	Yes	No
1. Called power company to turn power off -	____	____
2. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
3. Located termination points of conductor -	____	____
4. Loosened terminals and removed defective conductor terminals and structure -	____	____
5. Applied corrosive inhibitor, if required by local authorities -	____	____
6. Terminated grounding conductor at points designated by authority having jurisdiction -	____	____
7. Fastened conductor to previously installed grounding electrode with clamp approved for direct burial -	____	____
8. Attached conductor securely to structure -	____	____
9. Called power company to turn power on -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 13

Task: Replace pilot light bulb using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:

	Yes	No
1. Located installation point -	____	____
2. Turned power off -	____	____
3. Determined that power was off by checking conductor(s) at point of connection(s) with voltage tester -	____	____
4. Removed required cover plates and trim to get to bulb -	____	____
5. Replaced the bulb with the new one -	____	____
6. Made necessary wiring connections, if any -	____	____
7. Replaced cover plates -	____	____
8. Replaced trim -	____	____
9. Turned power on -	____	____
10. Assured required operation of pilot light -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements of the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 14

Task: Replace service entrance using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:	Yes	No
1. Removed power from existing service -	____	____
2. Removed existing service entrance -	____	____
3. Attached new meter base to structure -	____	____
4. Attached new service panel to the structure -	____	____
5. Ran conduit or service cable from the service panel to the meter base -	____	____
6. Ran conduit or service cable from the meter base to the service drop -	____	____
7. Attached conduit or cable to the structure -	____	____
8. Ran conductors through conduit, if conduit -	____	____
9. Installed weatherhead -	____	____
10. Installed new grounding electrode and grounding electrode conductor if required -	____	____
11. Tested for shorts and grounds -	____	____
12. Had service entrance inspected -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 15

Task: Replace transformer using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:

	Yes	No
1. Located existing transformer -		
2. Turned power off -		
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -		
4. Removed the existing transformer -		
5. Read manufacturer's instructions for the replacement transformer -		
6. Attached the transformer to the device -		
7. Removed cover plates -		
8. Made necessary wiring connections, using appropriate connectors -		
9. Replaced all cover plates -		
10. Turned power on -		
11. Assured required operation of the transformer -		

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 16

Task: Service electric motors using appropriate tools and equipment to restore function.

Achievement Indicators: The learner:

	Yes	No
1. Located motor to be serviced -		
2. Turned power off -		
3. Determined that power was off by checking conductor(s) at the point of connection(s) with voltage tester -		
4. Removed protective covers as required -		
5. Cleaned motor of all foreign materials -		
6. Checked all wiring connections -		
7. Oiled or lubricated as required -		
8. Replaced all protective covers -		
9. Turned power on -		
10. Assured required operation of motor -		

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Maintaining Existing Wiring	**Duty No.** H **Task No.** 17

Task: Test for correct voltage using appropriate tools and equipment to determine voltage level.

Achievement Indicators: The learner:

	Yes	No
1. Located circuit to be tested -	____	____
2. Determined what voltage should be -	____	____
3. Turned circuit on at the distribution service panel or switch -	____	____
4. Checked voltage using voltmeter -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:	**Resources:**

Duty: Maintaining Existing Wiring

Duty No. H

Task No. 18

Task: Troubleshoot a branch circuit using appropriate tools and equipment to determine problem.

Achievement Indicators: The learner:

	Yes	No
1. Turned power off, if required -	____	____
2. Located the power source and the route of the circuit to be checked -	____	____
3. Removed all cover plates -	____	____
4. Checked all connections -	____	____
5. Checked voltage with voltmeter of each outlet begging at the service panel -	____	____
6. Checked each outlet for correct polarity -	____	____
7. Repaired or replaced the circuit, when short, open, or faulty circuit had been located, and used ohmmeter -	____	____
8. Replaced all protective covers -	____	____
9. Turned power on -	____	____
10. Assured required operation -	____	____

Criteria: Competence in the task will be recognized when the work meets the requirements outlined by the National Electrical Code and the local authority having jurisdiction.

Tools and Equipment:

Resources:

Duty: Using Employability Skills

Duty No. I

Task No. 1

Task: Investigate employment information using sources of employment information to identify employment opportunities.

Achievement Indicators: The learner:

	Yes	No
1. Developed a list of the prime sources of information concerning opportunities for employment -	____	____
2. Described special procedures, if any, required to utilize services, information, etc. -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills

Duty No. I

Task No. 2

Task: Identify job requirements using health, physical, legal, education, and other occupational information to determine the requirements of an occupation.

Achievement Indicators: The learner:

	Yes	No
1. Listed the significant requirements (health, physical, legal, education, etc.) of the appropriate occupation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills

Duty No. I

Task No. 3

Task: Acquire wage information using available resources to determine the approximate entry wages, general wage range, and significant fringe benefits for an occupation.

Achievement Indicators: The learner:

	Yes	No
1. Listed the approximate entry wages, general wage range, and significant fringe benefits for the appropriate occupation -	____	____
2. Compared these wages and fringe benefits with other selected occupations -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills

Duty No. I

Task No. 4

Task: Identify significant non-wage job characteristics using available resources to determine shift requirements, union affiliation, apprenticeships, occupational hazards, characteristics of work environment and other significant job factors.

Achievement Indicators: The learner:

	Yes	No
1. Listed and described the significant non-wage characteristics (e.g., shift requirements, union affiliation, apprenticeships, occupational hazards, characteristics of work environment, etc.) -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills

Duty No. I

Task No. 5

Task: Explore employment opportunities using available resources to describe local, regional, and national employment opportunities for an occupation.

Achievement Indicators: The learner:

	Yes	No
1. Described the local, regional, and national employment opportunities for the appropriate occupation -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

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Duty: Using Employability Skills	**Duty No.** I **Task No.** 6

Task: Analyze career ladder using available resources to describe job progression in an occupation.

Achievement Indicators: The learner:

	Yes	No
1. Described the career ladder associated with the appropriate occupational area -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills

Duty No. I

Task No. [illegible]

Task: Identify personal criteria with information about available alternatives using a decision-making situation and procedures and skills in decision-making to choose a job, further training or other alternatives.

Achievement Indicators: The learner:

	Yes	No
1. Compared personal criteria with information about a job, further training or other alternatives -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills	**Duty No.** I **Task No.** 8

Task: Prepare a resume using personal information to apply for a job.

Achievement Indicators: The learner:

	Yes	No
1. Prepared a resume -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills

Duty No. I

Task No. [illegible]

Task: Write a letter of application using personal notes to apply/inquire about a job.

Achievement Indicators: The learner:

	Yes	No
1. Wrote a letter of application/inquiry -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills	**Duty No.** I **Task No.** 10

Task: Complete a job application using personal notes to apply for a job.

Achievement Indicators: The learner:

The learner:	Yes	No
1. Completed a job application -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** I
	Task No.

Task: Demonstrate appropriate dress using a knowledge of job requirements to comply with standards of on-the-job dress and grooming.

Achievement Indicators: The learner:

	Yes	No
1. Described and/or dressed in the attire of the appropriate occupational area, including:		
a. grooming -	____	____
b. required health and safety equipment -	____	____
c. uniforms -	____	____
d. other ______________________ -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills

Duty No. I

Task No. 12

Task: Complete a job interview using communication and interpersonal skills to become employed.

Achievement Indicators: The learner: Yes No

1. Described and/or demonstrated appropriate characteristics for job applicants including:
   a. attire - ____ ____
   b. grooming - ____ ____
   c. conduct during the interview - ____ ____
2. Described and/or demonstrated the interview process - ____ ____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills	**Duty No.** I
	Task No. 13

Task: Describe personal criteria using references to identify acceptable job offers.

Achievement Indicators: The learner:

	Yes	No
1. Listed personal criteria (financial, social, etc.) which described a job offer -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills	**Duty No.** I **Task No.** 14

Task: Demonstrate interpersonal skills to achieve successful relationships with others.

Achievement Indicators: The learner:

	Yes	No
1. Identified probable causes for conflicts and at least one possible action to relieve the conflict -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:	**Resources:**

Duty: Using Employability Skills

Duty No. I

Task No. 1

Task: Identify source of continuing education for an occupation using available resources to identify career ladder alternatives.

Achievement Indicators: The learner:

	Yes	No
1. Described the types and sources of related continuing education for the appropriate occupation and/or advancement within the career ladder associated with the occupation	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

Duty: Using Employability Skills

Duty No. I

Task No. 16

Task: Describe job termination procedures using a knowledge of the occupational area to leave a particular job.

Achievement Indicators: The learner:

	Yes	No
1. Described procedures and practices for terminating a job -	____	____

Criteria: Competence in the task will be recognized when the achievement indicators are performed according to the satisfaction of the supervisor.

Tools and Equipment:

Resources:

CLASS ACHIEVEMENT RECORD

NAME TASK No.																						

STUDENT ACHIEVEMENT RECORD

ELECTRICITY

STUDENT ____

INSTRUCTIONS:

Mark each student's level of competence according to the following guide:

LEVEL	GUIDE
1	Student has been exposed to task
2	Task accomplished with assistance
3	Task accomplished to criteria by student
4	Ability to teach or demonstrate the task to others

TASK	LEVEL	DATE
A. COMPUTING SERVICE LOADS		
1. Balance the total load per phase.		
2. Calculate individual circuit load.		
3. Determine how many convenience and appliance outlets should be on each separate circuit.		
4. Compute the size of service entrance conductors.		
B. INSTALLING SERVICE ENTRANCE		
1. Install main service panel.		
2. Install circuit breakers in panel.		
3. Install main service disconnect.		
4. Ground service entrance equipment.		
5. Install mast-type (through the roof) service entrance.		
6. Install service entrance cable to service drop.		
7. Install temporary electrical service.		

TASK	LEVEL	DATE
B. INSTALLING SERVICE ENTRANCE (continued)		
8. Install underground electrical service.		
9. Install/connect mobile home service.		
C. INSTALLING SWITCH BOXES AND OUTLET BOXES		
1. Install bar-hanger.		
2. Install flush mount junction box.		
3. Install gangable boxes.		
4. Install octagon outlet box.		
5. Install surface mount junction box.		
6. Install outlet boxes for receptacles and switches in existing wall.		
7. Install recessed fixture housing in ceiling.		
8. Install flush mount switch and outlet box in a dry wall, lath, plaster, or paneled wall.		
9. Install flush mount switch and outlet boxes in a masonry wall.		
10. Install underground, watertight, cast iron box.		
D. ROUGHING IN FEEDERS, BRANCH CIRCUIT CABLES, AND CIRCUITS.		
1. Rough in armored cable to outlet box.		
2. Install non-metallic cable in outlet boxes.		
3. Rough in cable or conduit for branch circuits.		
4. Rough in circuit for two three-way switches with feed to the switchbox.		
5. Rough in a circuit for two three-way switches with feed to the controlled device.		
6. Rough in a circuit for two three-way and one four-way switch with feed to a three-way switch.		
7. Rough in a circuit for two three-way and one four-way switch with feed to the controlled device.		
8. Rough in a circuit for two three-way and two four-way switches with feed to a three-way switch.		

TASK	LEVEL	DATE
D. ROUGHING IN FEEDERS, BRANCH CIRCUIT CABLES, AND CIRCUITS (continued)		
9. Rough in cables for a single-pole switch with feed to the switch.		
10. Rough in cables for a single-pole switch with feed to the controlled device.		
11. Rough in a circuit for a single-pole switch with feed to the last device on the line.		
12. Rough in a circuit for a split circuit duplex receptacle.		
13. Rough in two duplex receptacle circuits.		
14. Rough in 120 or 240 volt circuits to distribution panel.		
15. Rough in cable between an existing box and newly installed box.		
16. Rough in circuit for two three-way switches controlling one device.		
17. Rough in a circuit to provide current to a door chime system.		
18. Rough in a circuit to provide current for an intercom system.		
19. Rough in wiring to provide current for a line-voltage thermostat.		
20. Rough in wiring to provide current for a low-voltage thermostat.		
21. Install conduit underground.		
22. Rough in direct burial cable.		
23. Splice two or more conductors using crimp-type connector.		
24. Splice two conductors using a pigtail splice.		
25. Splice two or more conductors using mechanical connectors.		
26. Run feeder cable from main service panel to auxiliary panel.		

TASK	LEVEL	DATE
E. TRIMMING OUT (FINISHING) ELECTRICAL DEVICES AND APPLIANCES		
1. Connect/install duplex receptacle outlets.		
2. Connect single pole switch.		
3. Connect/install single pole switch with pilot light.		
4. Connect/install three-way switches.		
5. Connect/install four-way switches.		
6. Connect split circuit duplex receptacle.		
7. Connect/install three-wire 220 volt receptacle.		
8. Connect/install four-wire 220 volt receptacles.		
9. Install/connect ground fault interrupting device.		
10. Connect recessed fixture box in ceiling.		
11. Connect wires from junction box to appliance.		
12. Connect/install emergency warning system.		
13. Install/connect hot water heater.		
14. Connect/install humidity control device.		
15. Connect intercom system.		
16. Connect low-voltage lighting control.		
17. Connect moisture resistant receptacle.		
18. Install/connect photo-electric cell control.		
19. Connect/install delayed action or time switch.		
20. Connect water pump motor.		
21. Install surface raceway.		
22. Install/connect automatic garage door operator.		
23. Connect de-icing equipment.		
24. Connect door chime system.		
25. Connect/install electric fence charger.		
26. Connect 120/240 circuits to circuit breaker panel.		
F. INSTALLING LIGHTING FIXTURES		
1. Connect/install post lights.		
2. Install/connect fan controlled by switch.		
3. Connect/install flood lights.		
4. Connect/install lighting dimmer system.		

TASK	LEVEL	DATE
F.. INSTALLING LIGHTING FIXTURES (continued)		
5. Install/connect heat-a-vent light.		
6. Connect/install light fixture.		
7. Install/connect photo-electric control on a light.		
8. Install/connect power failure lighting.		
9. Install/connect moisture resistant fixtures.		
10. Install/connect pilot light.		
G. INSTALLING ELECTRICAL ENVIRONMENTAL CONTROL COMPONENTS		
1. Connect/install baseboard heat unit.		
2. Connect ceiling heat cable to thermostat.		
3. Connect central electric heat.		
4. Connect furnace motor.		
5. Connect/install gas or oil fired heating unit.		
6. Connect line voltage thermostat.		
7. Connect low voltage thermostat.		
8. Connect/install wall heater.		
9. Install ceiling heat cable.		
H. MAINTAINING EXISTING WIRING		
1. Diagnose/repair flourescent fixture.		
2. Diagnose and repair/replace lights.		
3. Repair/replace relays and timers.		
4. Repair water heater.		
5. Install and maintain emergency lighting.		
6. Repair or replace frayed service cords.		
7. Replace existing interior load center.		
8. Replace cable.		
9. Replace circuit breakers.		
10. Replace existing receptacle or switch.		
11. Replace fuses.		
12. Replace grounding electrode conductor.		
13. Replace pilot light bulb.		

TASK	LEVEL	DATE
H. MAINTAINING EXISTING WIRING (continued)		
14. Replace service entrance.		
15. Replace transformer.		
16. Service electric motors.		
17. Test for correct voltage.		
18. Troubleshoot a branch circuit.		
I. USING EMPLOYABILITY SKILLS		
1. Investigate employment information.		
2. Identify job requirements.		
3. Acquire wage information.		
4. Identify significant non-wage job characteristics.		
5. Explore employment opportunities.		
6. Analyze career ladder.		
7. Identify personal criteria with information about available alternatives.		
8. Prepare a resume.		
9. Write a letter of application.		
10. Complete a job application.		
11. Demonstrate appropriate dress.		
12. Complete a job interview.		
13. Describe personal criteria.		
14. Demonstrate interpersonal skills to achieve successful relationships with others.		
15. Identify source of continuing education for an occupation.		
16. Describe job termination procedures.		

GLOSSARY OF VOCATIONAL TERMS

Advisory Committee. An appointed group of concerned citizens and educators representative of the occupations for which training is given in the local school, organized for the purpose of helping to plan vocational programs and offering counsel on their development and operation.

Apprenticeship. An instructional program in which the learner works directly under a qualified craft worker to learn a trade.

Career Development. A lifelong process involving a series of experiences, decisions, and interactions, which, taken cumulatively, results in the formulation of a viable self concept and provides the means through which that self concept can be implemented both vocationally and avocationally.

Career Education. The total effort of public education and the community to help all individuals become familiar with the values of a work-oriented society, to integrate such values into their personal value systems, and to implement those values into their lives in such a way that work becomes possible, meaningful, and satisfying to each individual.

Career Interest. The student's decision to pursue a job description or cluster within a vocational education program area.

Cluster of Occupations. Occupations for which a common core of instruction can prepare, as for example automotive trades which prepares for such occupations as auto mechanic, auto body repairman, automotive services, auto inspector, and brake adjuster.

Completion. That statistic which describes individuals, including early leavers who have achieved their immediate objectives in preparation for entry or progressing in an occupational field and have left the vocational education program.

Cooperative Vocational Education. An instructional plan which combines learning experiences gained through regularly scheduled supervised employment in the community and vocationally oriented in-school instruction.

Coordinator (Cooperative Education). A member of a local school staff who teaches occupational and related subject content to students preparing for employment and coordinates the efforts of all helpful agencies which can assist in a training program designed to meet the needs of learners in a cooperative vocational education program. At times the coordinator may have varying degrees of responsibility in adult vocational education.

Course. A defined segment of a program.

Course Outline. An outline of subject matter to be presented or learning experiences planned for a course.

Course of Study. A guide prepared by administrators, supervisors, and teachers of a particular school or school system as an aid to teaching a given subject or area of study. More detailed than a course outline and includes statement of methods, materials, and equipment needed.

Curriculum. A sequence of educational and skill development experiences designed to accomplish a particular purpose. The curriculum for a program of vocational/technical education is designed to prepare an individual for entry, promotion, or upgrading in a specific occupation or cluster of occupations. (See definition of Cluster of Occupations.)

Disability. An injury or illness, temporary or permanent, which prevents workers from carrying on their usual occupations. A disability retirement is retirement because of physical inability to perform the job.

Disadvantaged. Disadvantaged persons are those who have academic, socioeconomic, cultural, or other handicaps that prevent them from succeeding in a regular vocational program designed for persons without such handicaps, and who for that reason require specially-designed educational programs and related services, or both, in order for them to benefit from a vocational program.

Discharge. Dismissal of a worker from employment. The term implies discipline for unsatisfactory performance and thus is usually limited to dismissals for such reasons as insubordination, absenteeism, or inefficiency.

Discrimination. Unequal treatment of workers in hiring, employment, pay or conditions of work because of race, national origin, creed, color, sex, age, union memebership activity, or any other characteristics not related to ability or job performance. Discrimination is prohibited by Federal, State, and local laws.

Duty. A large segment of work performed by an individual. It is one of the distinct major activities involved in the work performed, and it is composed of several related tasks.

Employer. General term for any individual, corporation, or other operating group which hires workers. The term "employer" and "management" are often used interchangeably.

Evaluation. A measuring or assessing of effectiveness. An on-going process by which effectiveness and progress are determined, used to guide change and offer directions for program modification and operation.

Exploratory Experiences. Those experiences in a variety of occupations, which help the students identify job traits in relation to their abilities and characteristics, and to assist them in making realistic and appropriate occupational choices.

Follow-Up Report. Usually a composite short-term or long-term report of former students indicating their present employment status or other present commitments (education, military, homemaking). More sophisticated follow-up studies seek to assess the effectiveness of the cooperative training experience to the student's present situation. Individual follow-up information is usually maintained in a student's record file.

Follow-Up Study. A study of the occupational status and progress of former students, as a means of evaluating effectiveness of the school's program of occupational preparation, of improving such preparation, and/or of determining needs of former students for further services.

General Advisory Committee. A committee that advises an institution as to its vocational/technical education activities overall. (See also; Occupational Advisory Committee).

Guidelines. The means by which significant characteristics in the evaluation of an institution or program are identified or measured.

Handicapped. Handicapped persons are those who are mentally-retarded, hard of hearing, deaf, speech-impaired, visually-handicapped, seriously emotionally disturbed, crippled, or other health-impaired persons who, by reason of their handicapping conditions, cannot succeed in a regular vocational or consumer and homemaking education program without special educational assistance, or who require a modified vocational program.

Hazardous Occupation. An occupation designated by State of Michigan and/or federal law to be considered dangerous to the health and well-being of minors.

Individualized Instruction. That type of instruction that provides techniques through which the teacher can work directly with individual students, as opposed to group instruction.

Inservice Teacher Education. All educational, and professional activities contributing to professional competencies which a person engages in after becoming employed, such as: formal course work, work experience, internships, practicums, seminars, and independent-individualized studies.

Internship. Student performs in approved job situation. Usually paid and given credit for the work. In-school instruction usually given before the work period and seldom tied in directly with job experiences. Typically one semester or more. Internship is a term used for collegiate experiences.

Job. The duties and tasks actually performed by a specific individual.

Job Analysis. See: Occupational Analysis.

Job Description. A written statement listing the elements of a particular job or occupation. The statement may include the purpose of the job, duties, equipment used, qualifications, training requirements, physical and mental demands, and working conditions.

Job Placement. Those organized activities performed by a guidance counselor or job placement coordinator designed to assist students in locating employment.

Job Type. A group of jobs that are composed of essentially the same significant duties and tasks.

Learning Resources. All textbooks, reference materials, equipment, supplies and other items and materials needed for successful achievement of learning objectives.

Manpower. People available to perform needed labor.

Management System. A technique employed to provide an organized method of accomplishing stated mission, goals, and objectives.

Minimum Wage. The lowest rate of pay, established by law or through collective bargaining, at which covered workers may be employed. The minimum wage is usually expressed as an hourly rate.

M.O.I.S. Michigan Occupational Information System.

National Occupational Competency Exam. A written and a performance exam developed by the National Occupational Competency Testing Institute, sponsored by T&I Education, for the purpose of determining the degree of competency that one has in a specific trade and industrial occupation.

Occupational Analysis. A technique for finding out what a worker in a specific occupation does and what he needs to know to perform his job efficiently, which is then used as a means of determining the teaching content in an occupational preparatory program.

Occupational Advisory Committee. A committee advising as to a program preparing for a particular occupation or cluster of occupations.

Occupational Competence. Includes technical knowledge and skills; manipulative skills; communication skills; human relations skills; work habits; and the ability to reason, to solve problems, to think independently, and to make judgments necessary for satisfactory employment in the occupation.

Occupational Field. A group of recognized occupations having many similarities, including the following characteristics in common; the type of work performed; the basic aptitudes, and the acquired knowledge and training required; the tools, machines, instruments, and other equipment used; and the basic materials used.

Occupational Objective. An occupational goal, selected by the student, the attainment of which is the purpose for his/her vocational instruction.

On-The-Job Training. Instruction in the performance of a sequentially planned task given a student-learner by the employer during the usual working hours of the occupation. Learning experiences at the training station comprises both the application of the theory of and the technical skill aspects of the learning situation, and/or the proper character, attitude and personality development of the student-learner as general goals of the training situation at the training station.

Occupational Information. Systematically organized data used by guidance personnel and others for the purpose of helping persons make a vocational choice. Material concerns the nature of the work, duties, responsibilities, and compensations involved in the several vocations, including information about employment outlook, promotional opportunities, and entrance requirements.

Occupational Objective. A specific recognized occupational goal, selected by the student, the attainment of which is the purpose of his vocational instruction. Also called: Career Objective.

Placement Coordinator. A person who provides local leadership to plan and initiate placement services.

Placement Services or Placement Activities. A series of coordinated activities for students planning further education or seeking part-time or full-time employment either for additional education, for on-the-job training or for earning a living.

Preparatory Instruction. Instruct on preparing students for full or part-time employment. Also serves to prepare students to enter and advance in an occupation. Also serves to equip workers with new or different skills demanded by technological changes.

Preparatory Program. A preparatory program provides vocational instruction designed to prepare individuals for gainful employment as semi-skilled or skilled workers or technicians or semi-professionals in recognized occupations. Preparatory programs are provided in the school laboratory/classroom.

Professional Organizations. Groups of personnel interested in and working toward the improvement, advancement, and upgrading of activities, not only in their specific field, but also of activities in related fields of endeavor such as the American Vocational Association.

Program (Vocational Education). "Vocational program" means laboratory, simulation or instruction based upon individually designed learning experiences in a vocational subject preparing the student for competencies required in a recognized occupation coded in accordance with the most recent vocational education listing of programs by the United States Department of Education.

Related Vocational Instruction. In-school courses specifically designed to improve personal and social skills, provide needed basic education (remedial), and/or develop relevant occupational skills and knowledges. The course should be regularly scheduled, should complement the learning experiences at the training station, and should be planned and developed to meet the specific needs of the individual student. The content of this course should consist of the theory of the occupational skill, the specific related information, and the general related instruction necessary to achieve personal success in the world of work.

Resources. People, money and materials available to an institution in carrying out its purposes.

School Community. The total community from which the school draws students, support, and resources.

School District. An administrative unit at the local level which exists primarily to operate public schools or to contract for public school services. Normally, taxes can be levied by such units for school purposes. These units may or may not be coterminous with county, city or town boundaries. This term is used synonymously with the term "local basic administrative unit."

Skills. The acquisition of knowledge, ability, proficiency, dexterity and technical expertness that enables one to develop a learned power of doing a thing completely.

State Plan. The document submitted by the state board for vocational education to the U. S. Office of Education describing the state's vocational education program. Includes policies followed by the state in maintaining, extending, and implementing existing programs and establishing new programs to meet the intent of the Vocational Education Acts. Prerequisite for receiving federal funds under the Acts.

Survey, Community. A fact-finding study of socioeconomic conditions and resources, community agencies, industries, business, farming, institutional practices, problems and practices of families, etc., as they exist at a given time in a given community. It is generally used by the school as a guide in revising school offerings to meet local needs.

Survey, Occupational. A form of occupational census, taken by personnel trained to determine the number of qualified employees in a designated occupation in a specified geographic or economic area; and to evaluate the need for increasing or limiting the numbers available for employment in the occupations surveyed.

Task. A unit of worker activity that is intermediate in specificity between a function and a procedural work step or action. It is a discrete unit of work performed by an individual; that is, the unit usually has a definite beginning and ending, and it is performed within a limited period of time.

Task Analysis. A detailed listing of skills necessary to perform a clearly defined, specific job, organized into a logical sequence and which may be used for teaching employment, or classification purposes.

Task Inventory. An instrument used for conducting an occupational survey. It consists of items of identification and background information and a list of appropriate duty and task statements.

Teacher-Coordinator (Cooperative Vocational Education). A member of the local school staff who teaches technical and related subject matter to students preparing for employment and coordinates classroom instruction (related classroom) with learning activities at the training station. The coordinator is also responsible for the evaluation procedures of the program.

Trade and Industrial. Instruction planned to develop basic manipulative skills, safety practices, judgments, technical knowledge, and related occupational information for the purpose of preparing persons for initial employment in the trades and industrial occupations.

Training Agreement. A statement of fundamental agreements regarding the participation of a student in a work environment. Initiated by the school, the agreement reflects a voluntary and cooperative commitment on the part of the coordinator, employer, student, and parents/guardians.

Training Plan. A format for delineating, for each student, the learning experiences and tasks to be undertaken at the training station, often paralleled with classroom units of instruction. The training plan, cooperatively determined, usually becomes a part of the training agreement.

Training Station. The establishment providing learning experience for the student-learner.

VICA. Vocational Industrial Clubs of America. The youth organization for students at secondary and post-secondary levels who are in preparation for employment in trade & industrial occupations.

Vocational Education. Organized educational programs, services, and activities which are directly related to the preparation of individuals for paid or unpaid employment, or for additional preparation for a career requiring other than a baccalaureate or advanced degree.

Vocational Student Organizations. Organizations for student-learners that complement the vocational education program. Recognized student-learner organizations for vocational education are: DECA, Distributive Education Clubs of America; FFA, Future Farmers of America; FHA-HERO, Future Homemakers of America-Home Economics Related Occupations; HOSA, Health Occupations Students of America; OEA, Office Education Association at the post-secondary level in Michigan and BOEC, Business Office Education Clubs at the secondary level; VICA, Vocational Industrial Clubs of America. Organizations for students enrolled in vocational education programs, with national, state and local units, the activities of which are an integral part of the instructional program.

Work Experience and Career Exploration (WECEP). Program emphasizes learning experiences at the training station based on individual needs and provides learning experiences for those students whose needs cannot be served by regular cooperative education programs.

Work Experience Program. Students perform tasks of the actual job and may or may not be paid. Typically engaged in for general education values, including exploratory. Usually one semester or less. Limited school supervision; usually no related class.

Work Observation Program. Student observes work, does not perform tasks except to understand them. Unpaid. Plan is usually few weeks in length and may be tied in with a class in which occupational information is discussed.

Work-Study Program. A federal program designed to provide a vocational education student with employment in the public sector and supplemental income while attending school. The vocational program does not necessarily have to be related to the job.

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